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# QUEENSLAND AGRICULTURAL JOURNAL

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## Event and Comment.

### Science and Primary Industries.

QUEENSLANDERS had the pleasure recently of welcoming amongst them three distinguished scientists who have won world fame, each in his chosen field. The visit of each, brief as it was, must influence beneficially the primary industries of this State. Dr. Orr, of the Rowett Institute, Aberdeen, who was here in June, has carried out work in Scotland in the course of the past few years, the value of which to the pastoral industry it would be very hard to estimate or exaggerate. While in Brisbane, he expressed himself as amazed with the extent and value of the scientific work performed by officers of the Department of Agriculture and Stock. To him, in his own words, it was a revelation. He made no secret, however, of his conviction that the application in Australia to-day of knowledge on animal nutrition acquired since the war ended will soon give results that will convince our stockowners that their industry must reap richer rewards from scientific effort if they will only co-operate with the scientist in that work. Sir Arnold Theiler was also with us for awhile and will be in Australia for some months longer. It was he who built up the great veterinary research institute at Onderstepoort in South Africa. Sir Arnold has already seen in Australia plenty of scope for increased activity in veterinary work in both the cure and prevention of animal diseases. Before long we may expect him to give us the facts as he sees them, and when Dr. Orr has done

the same it is certain that definite lines will be laid down for all those who desire to raise our pastoral standards to follow. Our third visitor was Sir John Russell, Director of the Rothamsted Experiment Station in England and Director-designate of the Imperial Bureau of Soil Science, whose two Brisbane lectures are published at length in this issue.

## Deterioration of Pastures.

THE latest knowledge acquired in the course of a world-wide inquiry into pastoral problems bears out the fact that lack of phosphates in pastures is one of the principal causes of restricted fecundity and losses of young stock. Only recently it has been discovered that the availability of iodine in stock foods is of the utmost importance in animal husbandry. Sir Arnold Theiler has informed us that, in his opinion, two-thirds of our pastoral worries in the form of pests and parasites would disappear if the proper feeding of stock were generally practised. In support of this statement we might regard, as an example, the fact that the first sheep attacked by blowflies in a bad fly season are always the sick members of a flock. Wormy sheep suffer from the pest to a far greater extent than healthy sheep. Sir Arnold Theiler has come to Australia in response to an invitation from the Commonwealth for the express purpose of giving us the results of his many years' researches in veterinary science and through his activities the pastoral industry should benefit immensely.

## Soil Fertility.

SIR JOHN RUSSELL'S lectures on agricultural science were of the utmost importance to farmers. He pointed out to us that agriculture is not as prosperous as it should be in Australia, seeing that we have the soil and climate to produce almost anything. It is impossible to forecast how far our development will extend, he said, if the producers will only adopt the proper methods. There is scope, he added, for greater progress by using improved agricultural machinery and the breeding of better stock, by the cutting out of waste, and by generally increased production. Sir John paid a well-deserved tribute to the Australian Press for the amount of space given to agricultural matters. Our show societies, particularly the Royal National, he noticed were also doing excellent work in advancing rural industry.

## A Noted Visitor's Defence of the Queensland Sugar Industry.

ANOTHER visitor of note in the course of the month was Sir Ben. H. Morgan, chairman of the British Empire Producers' Association. In the course of a Press interview, he held out great hopes for the early expansion of Queensland's primary industries. Speaking in regard to the Australian sugar industry, Sir Ben. said that actually the Empire supplied the Mother Country with less than one-third of its requirements of sugar. "There is an unlimited market," he added, "for Queensland sugar if it can be produced at a price which will enable it to compete with the rest of the world. I realise that as yours is the only white-grown sugar you have a big handicap in regard to the cost of production, but that is not necessarily insuperable. Britain is at present giving preference by her Budget to Australian sugar, and we hope that in the next Budget this preference will be very substantially increased. Then there will be an entirely new outlook for the disposal of the surplus sugar of Queensland. In England we realise that you have in Queensland some of the finest sugar country in the world. I do not want to say a word as to your labour conditions until I have been over your canefields and have seen for myself the actual position. If you can compete in producing sugar at a price approximate to world's parity there is no limit to the development that can be carried out in sugar production in Queensland. We are anxious to stimulate the

production of sugar within the Empire. It is not beyond the wit of those engaged in the industry to find some means of taking the place of the Cuban sugar-growers who, to a large extent, supply the British market. There are three by-products which undoubtedly will assist the industry in Queensland very much in the future in the direction of making the industry more profitable, and thus bringing it nearer to the point at which it can compete on the world's market. These by-product industries are the manufacture of megass board, the manufacture of power alcohol, and the conversion of megass into pure cellulose for the manufacture of artificial silk, or the best qualities of paper. The last is a new process which has just been devised, and a small factory has been established in Germany with the view of conducting practical tests. From all reports there is great hope for this industry, but it will take time to develop it. These by-product industries ought to contribute a great deal to reducing the cost of producing sugar, providing that they are manipulated by the owners of the sugar mills.'' Quite spontaneously Sir Ben. added: ''Since my arrival in Australia I have seen in the Press of the Southern States a number of attacks made upon the Australian sugar policy. Most of these attacks have been based on the relative retail price of sugar in Australia as compared with other countries. These attacks completely fail on such a comparison, for a review of the average price of sugar in Australia over a period of years will show it to be as low as in Great Britain, or any other free market. In addition, you have your nucleus supply of an essential commodity; you are giving employment to your people; and you are maintaining your White Australia policy. I am surprised that this propaganda should be allowed to continue in Australia, in face of the facts that could be adduced to controvert it.''

## Vocational Training for Country Children—Schools on Wheels.

BRINGING technical training within reach of country children is part of Queensland's progressive educational policy. To enable this to be done, travelling manual training schools and travelling domestic science schools, housed in specially built railway carriages, have been provided. The schools remain in one centre for about seven weeks, during which time the children go through a course of intensive training. Classes for grown-ups are also provided. Speaking at a recent official function, Mr. McKenna, the Under Secretary for Public Instruction, stressed the obligation of giving equal chances, as far as possible, to every child in the State. The problem, he said, was a difficult one, but when they had another domestic science school and manual training school on the railway, they would be able to provide for every part of the State that could be reached by rail. It was difficult to estimate the real value of these schools, he added. The teaching of manual dexterity was a very great asset to children, even if they desired to enter the professional ranks afterwards. Big changes in the educational system had been forecasted by his Minister, Mr. T. Wilson. It meant that every boy at the age of twelve years would receive vocational training, and every teacher that went through the teachers' training colleges would take either a course in manual training or domestic science training. In the bigger centres of population special vocational schools would be opened for the children. Queensland children were the best in the world, and on that foundation they based their education system. In the course of an address at the same function, Mr. J. D. Story, I.S.O. (Public Service Commissioner), maintained that the country child was not getting any more than he was entitled to get. Over 40 per cent. of the breadwinners of to-day were connected with primary production and the main wealth of the State came from primary production. Queenslanders were never inclined to praise themselves, and in that respect the Americans smiled at them. But Australia, and Queensland in particular, was leading the way in many things. In no State in the Commonwealth were they doing more for the education of the country children than in Queensland. He paid a tribute to the Country Women's Association for the valuable work they were doing. Theirs was a labour of love, which was done at great expense and often inconvenience.

# Bureau of Sugar Experiment Stations.

## GRUB DAMAGE AT YURUGA.

*The following report (9th July, 1928), submitted by Mr. J. H. Buzacott, Assistant to the Entomologist at Meringa, has been received by the Bureau of Sugar Experiment Stations:—*

Grubs of the greyback cockchafer have done a lot of damage in the Yuruga district this season. They have been very freely operating in cane lands in close proximity to scrub, and it was noted that the scrub there abounded in favourite feeding trees of the adult beetle.

Evidently many of the grubs had already gone down deep into the soil preparatory to turning into pupæ, but at the same time there were quite a number which had only recently moulted into the third stage, and even one late second-stage grub was seen.

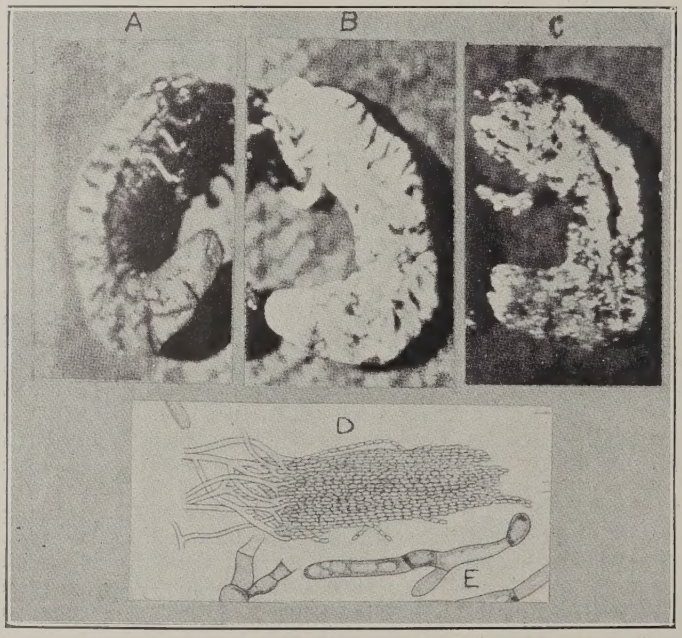


PLATE 12.—GRUBS OF THE GREYBACK CANE BEETLE KILLED BY GREEN MUSCARDINE FUNGUS.

A.—Stage 1, body filled with roots of the fungus, hardened internally. B.—Stage 2, body covered with white fungus growth of hyphæ. C.—Stage 3, body encrusted with green masses of spores. D.—A prismatic mass of spores, × 160. E.—Spores germinating, × about 700.

### Recommendations.

At such a late period, when most of the damage has been done, it would not be profitable to fumigate, but should any farmer desire to do so next year, full particulars of how to go about it will be found in a special pamphlet on the subject, written by Mr. Jarvis, Entomologist at Meringa, near Cairns, and any further information desired will be willingly supplied by the Bureau on application to the Meringa Sugar Experiment Station.

Feeding trees of the adult beetle should be felled as far as possible in the scrub near cane fields, and of these trees the most important are—Figs of all kinds (*Ficus*

sp.), Moreton Bay Ash (*Eucalyptus tessalaris*), She Oak (*Casuarina* sp.), also any other trees on which the beetles are noticed to congregate in numbers during the flighting season.

The collection by hand of grubs and beetles is also strongly recommended, and for this purpose the establishment of a Pest Destruction Board to pay for the specimens collected would be advisable.

All insectivorous birds should be strictly preserved and encouraged, and of these the most valuable to the cane farmer are:—The Straw-necked Ibis (*Carphibis spinicollis*), the Indian Myna (*Acridotheres tristis*), the Peewit (*Grallina picata*), and the Jackass (*Dacelo Leachii*).

Good cultivation also helps by promoting healthier growth of the cane and thereby enabling it to better withstand the ravages of the grubs.

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## CANE CROP PROSPECTS.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, who has been visiting officially the sugar-cane areas of Cairns, Babinda, Innisfail, South Johnstone, Mackay, and Bundaberg, has returned to Brisbane.

It is now evident, Mr. Easterby informed us, that the huge sugar crop predicted earlier in the year is not likely to materialise, and the yield will probably not be any better than that of last year. This depreciation has been caused in some districts by excessive rains, and in others by the early arrowing or tasselling of the cane which puts a period to its growth. Grubs have also caused much damage in the North this year. In some parts of the far North cane cut late last year, and only 2 ft. or 3 ft. high, is arrowing, and the anticipated extra growth of such cane which would be harvested later in the season cannot now be hoped for. Many of the mills have reduced their estimates; others must follow suit. Much cold weather had been experienced early this year, and even at Innisfail slight frosts had been reported in lowlying places.

In spite of climatic drawbacks, however, the crop should be a good one, and the various mills north of Townsville were all working steadily and crushing large weekly tonnages of cane.

The Mulgrave Mill has just finished the erection of a large new sugar store, and can now provide for from 7,000 to 8,000 tons of sugar in the event of shipping trouble. A new chimney stack has been built to replace the one destroyed in last year's cyclone. New electric motors, pumps, and crystallisers have also been installed, and it is proposed to add a fourth crushing mill next season. The mill management are to be complimented on the general efficiency of the plant. Rat destruction in the canefields is being systematically pursued with the aid of Barium biscuits, which are specially baked and distributed by the mill at an exceedingly low cost.

It is always pleasing to note the progress of local secondary industries, especially when these aid in the consumption of sugar. The recently erected North Australian Brewery at Cairns is now achieving considerable success. The wages paid amount to over £8,500 per annum; 2½ tons of refined sugar are consumed every week. Local timber is used for casing and barrels, and Bowen and Mount Mulligan coal for steam purposes. Tasmanian hops, South Australian barley, and Victorian malt are utilised, the aim of the company being to use everything Australian.

The Babinda cane areas, especially those on the Russell River, are looking well; some grub damage has occurred in places, and a good deal of the cane cut late last year is already arrowing, which must reduce the total crop.

Practically all the cane in the Innisfail district and most of that on the Herbert River has already arrowed. The cane on the Johnstone River is not so far forward as at this time last year. The crops on the Tully are good this season, and the mill is now getting well ahead with the crushing after the strike delay.

The Mackay district also will not realise its anticipated tonnage due to excessive rains and early arrowing of the cane.

At Bundaberg the crop has not been affected so much by arrowing, and the mills expect to crush their earlier estimates.

The annual field days of the Mackay, South Johnstone, and Bundaberg Experiment Stations were held during he Director's visit North, and in each case were highly successful, large crows of canegrowers attending. The machinery exhibits

were of an excellent order, and proved of much interest. Displays of typical cane diseases and insect pests aroused considerable attention.

A visit was also paid to the Harbour Board's plant at Townsville. Considerable improvements have been made recently. The Jetty wharves are now brilliantly lit with electricity, and are being extended by another 650 ft. A large store with mechanical means of handling sugar has been erected, and it is now possible to store about 6,000 tons of raw sugar; provision for the coaling of large vessels is also being carried out.

## ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

### How Growers can Keep an Eye on the Weevil Borer.

Now that cutting is in full swing growers have an opportunity of locating the whereabouts, and of determining the degree of damage done to their cane by the weevil borer *Rhabdocnemis obscurus* Boisd. By examining a "rake" of cane before it leaves the field the presence of this insect can at once be detected, as at such times the tunnels of the beetle—which appear in transverse section at the cut ends of affected sticks—are very conspicuous. By pulling out such canes from the trucks the extent of the injury is easily detected; and although often confined to a few inches of the basal portion, may extend half way, or even throughout the entire length of a stick. The occurrence of borer infestations should be carefully noted and communicated to the Entomologist at Meringa without delay.

Tachinid parasites of this weevil will be liberated by the Sugar Bureau free of cost on such affected areas, on the condition that growers concerned will agree to leave at least an eighth of an acre of borer-infested cane sticks for these parasites to breed in. This area should be allowed to remain uncut for three months or longer, and must not be burnt.

*Note.*—One cannot expect to successfully establish these useful parasitic insects unless they be looked after by the grower and given a chance to multiply. Indiscriminate burning of the cane in which the flies have commenced to breed is one of the chief causes of failure to secure the permanent benefit which should result from liberations of this Tachinid.

### Horse Machine for Fumigating Cane Grubs.

Collaboration between the Entomologist and those growers who are interested in applied science is very desirable in a problem like that of cane-grub control; since such concerted action, while not unduly trespassing on daily activities of the cane farm, might go far towards minimising the injuries caused by our more serious cane insects, and so be of financial benefit to all concerned. At the present time attention is called to a machine for applying paradichlor. and other soil fumigants to grub-infested plantations, by means of which a man could treat from 3 to 4 acres of cane land per day.

This machine can be seen at Meringa Experiment Station, and growers interested in the matter are invited to inspect same at any time and have a chat over the question of soil fumigation, &c. Copies of the pamphlet recently published by the Bureau, dealing with the above-mentioned methods of combating cane grubs, are still available for distribution, and may be obtained gratis by applying to the Director of Bureau of Sugar Experiment Stations, Department of Agriculture, Brisbane.

### "White Ants" Attacking Cane Setts.

Isopterous insects belonging to the genera *Termes* and *Eutermes* are occasionally responsible for noticeable injury to newly planted cane setts, particularly when these are put in during dry weather. Unlike *Mastotermes darwiniensis* Frogg., which is our largest species of termite, the smaller "white ants" of the two above-mentioned genera seldom invade the growing sticks or cane-shoots above ground level, usually confining their injury to internal woody tissue of the setts, or to the sprouting eyes.

Control measures consist in dropping poison-baits in the planting drills at short intervals. A simple form of such bait can be made from white arsenic 1 lb., megass 33 lb., molasses 10 to 15 lb. Mix the arsenic in about 2 quarts of water, and while stirring briskly to keep it from sinking to the bottom gradually add the molasses, stirring continually until it has thickened sufficiently to hold the poison in suspension. Then stir in the megass, mixing same uniformly with the poisoned molasses.

## CANE PESTS AND DISEASES.

*The Southern Assistant Entomologist, Mr. R. W. Mungomery, has submitted the following report to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, for the period June to July,* 1928:—

### Educating Farmers in Entomology.

Attention was called in a previous report (see "Australian Sugar Journal," June, 1928, page 163) when dealing with the question of cane grub parasites, to the importance of these friendly organisms, the results of their work being especially noticeable in the absence of bad grub damage on many of the Woongarra red volcanic soil farms. It would appear that whilst no damage of any great economic importance is being done in these parts, at the same time a balance exists in the ratio of host to parasite whereby any small increase in the numerical strength of the host is soon counteracted by a correspondingly small increase on the part of the parasites or predatory insects, so that for many years past this balance has been maintained and cane grubs have not been able to increase to the extent that they have warranted the institution of repressive measures in the abovementioned area.

This happy state of affairs would be welcomed in the Isis and other districts where cane grubs are present in numbers sufficient to do appreciable damage and cause some alarm. In the Isis district, it will be remembered, grubs are collected and paid for at the rate of 1s. per quart, and without wishing to discourage such collecting of grubs, I know that, unfortunately, too often many of our beneficial insects are included amongst those pests which are taken to the receivers to be destroyed and recorded for the purposes of payment. This, I have actually witnessed in the course of my visits from farm to farm, and I would suggest that, owing to the continual setback received through these parasites and predatory insects being destroyed, this is probably one reason why they are not so numerous there as the same species are in other places. Time and the extent of the protection afforded these parasites in the future will show whether this suggestion will prove correct or not.

No doubt in most cases the destruction of parasites has been carried out in complete ignorance of their true value, and when such glaring instances have come under my notice requests have been made to allow these insects to remain unmolested in the soil. However, it will be evident that it is not possible for the entomological staff to exercise a supervision over such collections and advise each collector individually in this manner. Therefore they are being approached through the receivers, each of whom will be made familiar with these beneficial insects, and receive instruction in the economy of the several species. In this connection Mr. Bates visited the Isis district recently, and exhibited to many of the receivers there the various parasitic and predaceous insects which attack our common cane grubs. Unfortunately, continued wet weather and the absence of some of the receivers from the district did not permit of all being visited, but those whom it was not possible to see then will be called on later.

It is to be hoped that these receivers will pass on this information to the collectors, and the position will then remain in the hands of the receivers. So it may come about that, by affording every opportunity for these beneficial insects to increase, the same favourable balance may be set up between host and parasite, such as now exists in the Woongarra district.

### Young Cane Grubs Active.

Cane grub attack, in the case of those species having a two-year life cycle, becomes noticeable chiefly from the month of September onwards throughout the summer, when the third stage grubs, having just moulted from the second stage, attack the cane roots very ravenously.

Damage in many parts has this year shown up as early as May, when it was seen that younger second stage "furfuracea" grubs had succeeded in eating out portions of a block of February plant cane. When such newly-planted sets have been destroyed in this manner, soil fumigation is then of little practical benefit, the best plan being to plough out and plant again, care being taken to handpick the grubs. Investigations are now being pursued relative to the possibility of poisoning these grubs, and experiments in this direction will be carried out during the next period of grub activity.

*The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following Report for the month ended 12th July, 1928, from the Assistant Entomologist at Mackay (Mr. A. N. Burns):—*

**Occurrence of Cane Butterfly (*Melanitis leda bankia* Linn.) in Mackay District.**

For some weeks past this insect has been plentiful throughout the district, especially in canefields situated in lowlying areas or adjacent to creeks and gullies. The butterflies do not fly readily in the day time unless disturbed; they then usually fly for a short distance only, settling amongst trash, dead leaves, &c., with the wings folded over the back. Unless watched closely when settling they are extremely difficult to detect, the undersides of their wings being the colour of dead leaves, thus harmonising with their surroundings. On account of this protective colouration when at rest, this insect is sometimes called the "Ghost Moth" by farmers in Southern Queensland and in the northern coastal districts of New South Wales.

Contrary to the general rule, this butterfly flies normally at and just after dusk. It measures about 3 in. across the expanded wings, and is coloured as follows:—

Forewings, above.—From base to half-way to outer edges dark reddish brown, then a lighter orange brown patch in which is another black marking enclosing two white (lightly suffused purplish) spots, the upper one of which is the larger. Apex and other edge broadly dark smoky brown-black. Outer edge of wing just below apex, with a small blunt tooth.

Forewings, beneath.—Uniformly some shade of dark brown, brownish black, or smoky black; (undersides of individual specimens vary very considerably) sometimes suffused greyish or purplish; barred or irregularly mottled or striated with darker markings.

Hindwings, above.—Basal and lower central area, dark reddish brown suffused blackish; remainder of wing to edges dark smoky brown, almost black; outer edge bearing a blunt tooth (slightly curved upwards) at lower angle.

Hindwings, beneath.—Uniformly some shade of dark brown, brownish black, or smoky black; sometimes suffused greyish or purplish, and irregularly striated or mottled with darker markings. In some examples two or even more small ocelli (eye spots) occur near the outer edge of the wing. These are usually most numerous near the lower portion of the wing.

There are two very distinct forms of this butterfly, the wet season form (described above) and the dry season form (*M. leda barnardi*). Dry season examples are considerably smaller than those that occur during the wet season; the wings are of a lighter brown colour, and are not so conspicuously toothed. The underside of the wings is also very different in this form, being of a greyish, pale yellowish brown or light ochreous colour, thickly striated with darker markings, almost giving the pattern of finely-grained wood. A number of clearly defined black circled ocelli (eye spots) also occur near the outer edges of the wings underneath in this form.

The eggs are pale creamy green in colour, and are laid in rows orsmall groups of numbers varying from two or three up to twenty or more on the undersides of young cane leaves. Just before hatching the eggs turn almost black in colour. The period occupied in incubation varies according to the season of the year; in April, eggs at the Laboratory took from three to four days to hatch. This period would be slightly shorter in the midsummer months, and longer at the present time (July).

The young caterpillars measure about $\frac{1}{8}$ in. long when just out of the egg, and are pale creamy green with black heads. From examples bred at the Laboratory, the approximate times spent in each instar (the period between each moult) was as follows:—

In the first instar, 9-10 days.

In the second instar, 5-6 days.

In the third instar, 7-8 days.

In the fourth instar, 7-8 days.

In the final instar, 8-10 days.

Total larval life, about 40 days.

After the first day or two after hatching from the egg the caterpillar's body becomes bright green; the colour of the head, however, remains black till after the first moult.

The fully-grown caterpillar measures about $1\frac{3}{4}$ in. in length, and is of a clear plant green colour; the whole body surface has a shagreened appearance, due to the presence of many minute tubercles. The general shape is cylindrical, tapering towards each extremity. The anal end of the body is produced into two pointed protuberances which extend a little beyond the last pair of claspers. The head is large and green in colour, with two erect horns projecting upwards. These are dark brown in colour, and the brown continues down the front of the head below the horns, forming two fairly broad longitudinal bands. These horns, also the head, carry numerous long brown fine hairs.

During the first three instars these caterpillars are gregarious, as they become fully grown, however, they separate and feed singly.

The pupa or chrysalis is translucent apple green in colour, and is about $\frac{3}{4}$ in. long. It is suspended by the tail usually to the underside of a cane leaf, where its green colour makes it very difficult to find. The time occupied in this stage is variable, being governed by the season of the year; it is as short as eight days in the summer months, and from two to three weeks in the colder months.

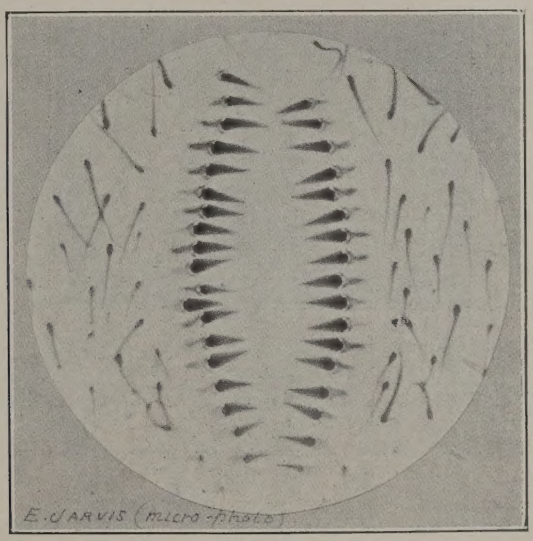


Plate 13.

Arrangement of spine-like bristles on ventral surface of anal segment of grub of *Lepidiota grata* Blkb. (highly magnified).

This insect is controlled naturally by both Dipterous and Hymenopterous parasites which affect the larval stages; recently at the Laboratory large numbers of a species of small Braconid (as yet unidentified) wasp were bred from larvæ collected in the field. Fully 75 per cent. of these larva were found to be parasitised. As many as fifty of these small parasites emerged from one caterpillar, and of these only 6 per cent. were males.

This cane insect rarely occurs plentifully enough to call for control measures. The writer, however, observed large numbers occurring over a fairly large area near Gordonvale (North Queensland), where the injury to the cane leaves could be seen for a considerable distance. Should control measures be called for at any time, a spray consisting a lead arsenate in the proportion of 1 lb. to 25 gallons of cold water, and applied to the leaves with a hand or orchard spray pump, will soon destroy any larvæ that may be feeding.

**Frenchi (*Lepidiota frenchi* Blkb.) Grubs Going Deeper into the Soil.**

Both second and third stage grubs of this cane beetle have now ceased feeding, and have burrowed deeper into the soil to form their cells. The second stage grubs will remain quiescent till about next September, when they will moult into the third stage and recommence feeding at cane roots. Growers who observe their cane wilting from grub injury in September, October, or even November, can be sure that the injury is not due to greyback grubs, as this species does not injure cane roots till January or February, and it is usually March at the earliest before the cane shows signs of wilting. In instances therefore, where damage shows up in the above-named months (September, October, &c.), "frenchi" grubs will be practically certain to be present under the stools. Where necessary to fumigate, this should be carried out immediately that any injury is visible. These grubs usually occur in "patches," and frequently the same local area is affected year after year, so growers should familiarise themselves with the portions of their farms where these grubs usually occur, and then before any injury is apparent, dig under a few stools, and, if the grubs are found in any numbers, fumigate the stools.

The grubs at present in the third stage now in their cells will remain dormant for several weeks before actually changing into pupæ. This inactive period of the grub's life is termed the pre-pupal stage. The actual time spent in the pupa is comparatively brief, lasting sometimes a little less than a month, sometimes a little longer, according to the season.

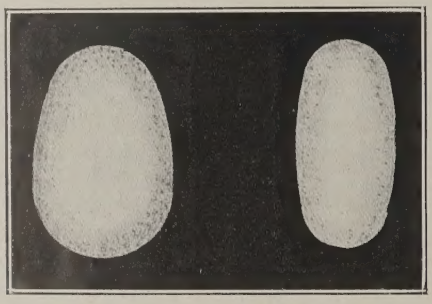

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Plate 14.

Fig. 1.—Scale from a wing-case of *Lepidiota grata* Blkb. (magnified about 360 diam.).

Fig. 2.—Scale from a wing-case of *Lepidiota rothei* Blkb. (magnified about 360 diam.).

The beetle freshly emerged from the pupal skin is soft, it therefore remains—sometimes for a couple of months—in its old pupal cell to "harden" and wait till the first heavy summer rains which render conditions suitable to enable it to burrow upwards and escape from the soil.

**Large Moth Borer (*Phragmatiphila truncata* Walk.) in Cane Sticks.**

Examples of this insect are continually coming under notice in soft canes (Clark's Seedling, &c.) growing in low areas. Now that the cutting season is commencing, growers should be on the look out for the occurrence of "dead hearts" and wilting of the central leaves of the young ratoons, also the young plant cane. On the first indications of yellowing of these central leaves, the affected shoots should be cut off well below the ground level, and destroyed by burning. If left till the central portion of the shoot is wholly dead, the borer caterpillar will have probably left that particular shoot and entered another.

Several shoots in a single stool can be accounted for by one borer caterpillar, hence may be seen the desirability of cutting out any shoots containing larvæ. Several shoots eaten out of stools, if only here and there, will eventually result in the loss whilst young of a good many sticks of cane in a row. If the infestation should be at all bad, these killed shoots if they had grown into matured cane sticks would have probably weighed several tons, taken over a whole cane field.

## CANE PEST COMBAT AND CONTROL.

*The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received from Mr. E. Jarvis, Entomologist at Meringa, near Cairns, the following report from June to July,* 1928:—

### How to Combat the "Giant Termite."

Although the so-called "white ant" of the Burdekin district—which may be said to rank as a cane pest of primary importance—has claimed our attention from time to time during the last few years, it still continues to be responsible for considerable damage in certain localities.

It is encouraging to learn, however, that according to recent reports its range of occurrence does not appear to have noticeably increased—a fact which may, perhaps, be due to the practice of better methods of cultivation on areas which formerly were badly affected, combined with more or less systematic attempts by the growers to combat the activities of this pest. In view of the interest taken in the matter by Burdekin growers, and the economic possibilities of the species in question, the following recommendations regarding approved methods of controlling such formidable insects will be appreciated.

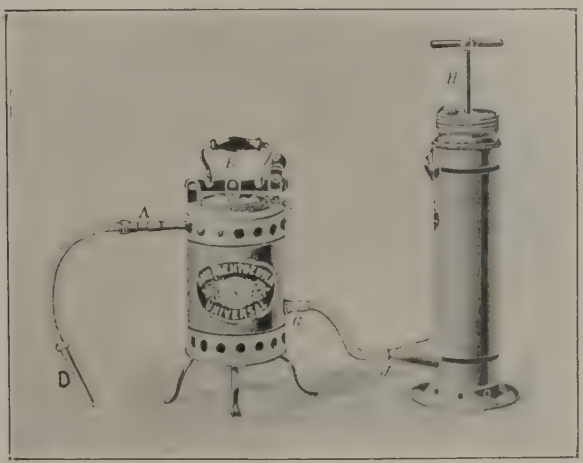


Plate 15.—"Universal Ant Exterminator"
(Stands about 33 inches high.)

Used for destroying the Nests or Termitariums of "White Ants," by pumping fumes of sulphur and arsenic into the underground galleries of same.

### Locating the Nest or Termitarium.

In most problems of this nature ideal methods are those which aim at getting at the source of the trouble, which, in the case of our greyback cane beetle, consist in efforts at capturing the females before they have had time to deposit their eggs; while in the present instance our first step should be an attempt to destroy the nest or termitarium—which contains the egg-laying mother or queen termite of the colony—from which the workers often travel long distances underground in search of suitable food.

The position of a nest can usually be found by tracing the path taken by the termites, and upon discovery the community should be destroyed, either by digging out same or by fumigating the spot. In the former case, when situated below ground level, it would be a good plan, after filling in with clean soil, to make a few injections of carbon bisulphide over the place with a Vermorel "Pal Excelsior Hand Injector" or a "Danks Injector," the fumes from which would kill the few termites still remaining in the nest or amongst the undisturbed subsoil. In the event of a nest being located in the stump or taproot of a large tree, which could not conveniently be grubbed out, the earth above same should be removed to a depth of about 12 in.,

and the infested wood treated with from ½ to 1 pint of a solution of paradichlor. dissolved in tar oil heated to about 120 degrees Fahr. and then diluted with two parts of water and poured into the termite tunnels. The affected spot should be at once covered with damp soil, slightly consolidated by pressure. In places where termites cannot easily be dug out or fumigated, it becomes advisable at times to lay down poison baits. A simple one, which has given success in the Dutch East Indies, is made from one part of Paris green (arsenite of copper) to 100 parts of sawdust. Another formula used by some of our Burdekin growers consists of white arsenic mixed with molasses and sprinkled around the nest or on termite-infested posts, stumps, &c.

One of the best and well-known remedies, however, is that of fumigating such communities with sulphur and arsenic by means of a special apparatus which is sold under the names of "Universal Ant Exterminator," and "Buckeye Ant Destroyer."

This appliance has been compared to a blacksmith's forge, the bellows being replaced by an air pump, by means of which a blast is driven through from J to G into the bottom of a small furnace B, and then upwards through a charcoal fire. When the furnace is in full force about 1 oz. of the poison powder is dropped on the fire and the lid closed. The poison is prepared by thoroughly mixing together flowers of sulphur and white arsenic in proportion of about 3 lb. of the former to 8 lb. of arsenic.

When applying same it is always advisable to pump the fumes into some main gallery or opening that is being used at the time by the "white ants." The heated poisonous vapour passed through the nozzle D (via the metal pipe A, and flexible iron hose), which is inserted into the ant hill.

Entomologists have stressed the importance of treating such nests or termitariums during the swarming period, while the internal system of galleries and passages has been thrown open by the worker termites for a few days, in order to permit the winged males and females to escape. At such times a maximum mortality is likely to result from prompt action, as the deepest ramifications of the nest can then be reached by the poison fumes.

It may be mentioned that this appliance for destroying "white ants" has been in use for the last fifteen years or more in Natal, where it is said there are no insects more destructive or so widely known as those belonging to the order Isoptera.

The conspicuous earthen mounds or termitariums built up by these insects are more easily treated than their subterranean nests. In addition to the sulphur-arsenic fumigant already described, a mortality of from 90 to 100 per cent. can often be obtained by the use of such fumigants as "Shell" benzine, calcium cyanide, and carbon bisulphide.

Experiments carried out at Meringa during 1926 with the first of these insecticides proved highly satisfactory.

The termitariums treated by us were those of *Eutermes vernoni* Hill (a species which attacks cane sets), and varied from 3 ft. to 5 ft. in height. In one instance half a pint of the benzine was poured into a hole 6 in. deep made in the top of the mound, which was then sealed with a piece of wet mud. Two days afterwards, when the termitarium was opened up, a mortality of 95 per cent. was noted. All of the surviving termites were soldiers, and the queen mother was found dead in her cell. Another nest, 5 ft. high, was treated with a pint of benzine, administered at a depth of about 2 ft. from the summit, and when examined ten days later a kill of 100 per cent. had occurred, and the odour of benzine still pervaded the interior of the mound. Two nests fumigated with calcium cyanide (flaked form) gave a 95 and 97 per cent. mortality, the dosage used being 2 oz., which was placed in one mound at a depth of 2 ft. 6 in., and in the other in a cavity at the top of the termitarium, both holes being afterwards sealed over with mud.

Carbon bisulphide is best applied by means of a tin funnel, the spout of which is inserted into a hole made at the top of the nest and the liquid poured through it. The funnel should then be at once removed, and the hole plugged to prevent upward escape of any fumes. Searching for subterranean nests of the Burdekin termite *Mastotermes darwiniensis* Frogg. often proves discouraging work, but should not on that account be neglected, seeing that the results obtainable by this control method are likely to be well worth any difficulties that may be encountered. It will be of interest to mention that control methods recommended in Brazil against *Leucotermes tenuis* Hag., which is considered to be their most important termite, consists in injecting into the nests carbolic acid, carbon bisulphide, benzine, or essence of turpentine.

# FIELD REPORTS.

*The Central Field Assistant, Mr. E. H. Osborn, has forwarded the following reports for the period 12th June to 12th July:—*

## PROSERPINE.

The mill was steadily crushing what the management hope will be a record crop of some 135,000 tons.

Local rainfall figures up to the end of June:—

| | Inches. |
|---|---|
| January | 7.31 |
| February | 24.13 |
| March | 24.13 |
| April | 5.91 |
| May | 1.23 |
| June | 1.05 |
| | 63.76 |

On account of so much rain in the earlier months only a limited amount of planting has been possible, the strike being medium.

The cane, although fair, did not show such good growth as in 1927; the ratoons especially being light. Good density returns were beginning to come in, the average weekly c.c.s. being just about 14 c.c.s. The chief cause of the lightness of the crop per acre was the excessive and continuous wet during the early months of the year. Proserpine, with the exception of the newer outside railway centres, has a proportion of low-lying and badly-drained land where water must lodge unless helped away. Upon such portions in particular the crops have suffered. Bedding-up in medium-sized beds has been carried out in many cases, but numerous headland drains that were totally inadequate to carry off the surplus water in particularly wet times were noticed. Again, it must be emphasised how very necessary such drainage is, and how it is absolutely impossible to grow satisfactory crops without it.

The large acreage of cane that was arrowing throughout the district was very noticeable.

## BANANA POCKET

This locality is still going ahead, and some good crops were seen, but these were not up to the generally high standard of the Banana Pocket cane, due again to the excessive wet; the ratoons in particular were backward. To facilitate harvesting operations, several of the growers have bought their own rails, and now have a horse-line right into their cane paddocks, with the result that they have their complement of trucks loaded and pulled out on the main line by 10 a.m. instead of being practically all day upon the job when carting direct. There are probably about 2 miles of such line in use now.

*Fertilising.*—Fertilising is becoming more popular, but there is room for much improvement.

Green manuring is carried out only to a very limited extent, although all the local soils would benefit greatly by its use.

Liming seems to be gaining favour. Its use on the very heavy soils, coupled with good drainage, should be of great benefit, but liming without adequate drainage is practically useless.

A small experiment under which molasses was used at the rate of some 2,000 gals. per acre upon some second ratoons—H.Q. 426 and M. 1900—shows them to be far superior in colour and general growth to any second ratoons in the neighbourhood.

*Pests.*—Grubs and borers seem to be more scattered in their attacks this season than formerly.

*Cane Varieties.*—The following figures, supplied by the mill management, emphasise how Proserpine has progressed during the past five years, for it shows how the percentage of better and sweeter varieties of cane has grown, the greater tonnage crushed, the heavier tonnage per acre, and the increased tonnage per individual grower in that period.

Percentage of Varieties.

| | 1923. | 1924. | 1925. | 1926. | 1927. |
|---|---|---|---|---|---|
| H.Q. 426 | 28·28 | 21·00 | 17·5 | 22·3 | 20·7 |
| Q. 813 | 17·94 | 21·20 | 24 0 | 22·0 | 24·5 |
| M. 1900 | 9·13 | 13·60 | 13·7 | 13·0 | 14·2 |
| N.G. 1 | 8·33 | 13·1 | 18·7 | 19 4 | 20·2 |
| E.K. 28 | .. | .. | ·04 | ·8 | 3·5 |
| Malagache | 8·78 | 6·8 | 5·1 | 4·0 | 2·5 |
| Striped Singapore | 3·59 | 1·7 | 2·4 | 1·5 | 1·2 |
| Mixed Varieties | 9·98 | 13·1 | 7·9 | 8·7 | 7·6 |
| D. 1135 | 4·43 | 4·1 | 3·9 | 1·6 | ·8 |
| Goru | 9·54 | 5·4 | 5·3 | 3·6 | 2·6 |
| Q. 1121 | .. | .. | ·3 | ·8 | ·2 |
| Q. 116 | .. | .. | ·4 | ·3 | ·3 |
| Q. 114 | .. | .. | ·5 | 1·0 | ·7 |
| 7R. 428 | .. | .. | ·1 | ·9 | 1·0 |

Yearly Crushings.

| 1923. | 1924. | 1925. | 1926. | 1927. |
|---|---|---|---|---|
| 35,387 tons | 64,741 tons | 104,208 tons | 72,000 tons | 121,673 tons |

Average Yield per Acre.

| 1923. | 1924. | 1925. | 1926. | 1927. |
|---|---|---|---|---|
| 7.94 tons | 15.2 tons | 15.5 tons | 9.8 tons | 16.8 tons |

Average Tonnage per Grower.

| 1923. | 1924. | 1925. | 1926. | 1927. |
|---|---|---|---|---|
| 116.02 tons | 217.3 tons | 273 tons | 192 tons | 328.8 tons |

The yearly rainfall, and the average c.c.s. per year, are also of interest, and are herewith given:—

| Year. | Rainfall. | c.c.s. |
|---|---|---|
| 1923 | 27.49 inches | 13.75 |
| 1924 | 71.06 „ | 14.28 |
| 1925 | 70.32 „ | 13.9 |
| 1926 | 37.36 „ | 13.3 |
| 1927 | 79.59 „ | 14.3 |

## HOME HILL.

This area was visited early in July. Conditions then were dry, and a number of the growers were watering. Despite the dry spell some really fine crops of cane were seen, and the opinion seems general that the estimate of 150,000 tons should about be reached.

As the writer had noticed quite a lot of dirty cane going into Proserpine, it was pleasing to see that in most cases the Inkerman cane was clean and well topped. As usual the mill was doing excellent work and a fine supply of cane was available.

In answer to inquiries it was ascertained that while the average c.c.s. was about 14, some remarkably high individual analyses had been recorded, with numerous instances of 17.5 for H.Q. 426 and B. 208, whilst a very heavy crop of E.K. 28 went the surprisingly high figure of 15.8 c.c.s. for this variety so early in the season.

A large area of young cane was noticed varying from a first class to a medium strike. In several instances the ground was very lumpy. This was explained by individual growers as being the result of too much heavy rain beating the previously extra well worked ground quite flat, and later when the land was again worked, too many lumps were the result. Several such paddocks could not have been fit to plant, but the excuse was that as one has to pay a flat watering rate he cannot afford to let such a block out of cultivation. This is probably quite correct, but at Home Hill (as well as in many other cane districts) many growers will persist in cultivating bigger areas than they can manage except with much luck.

*The Southern Field Assistant, Mr. J. C. Murray, reports for the period 11th June to 11th July:—*

## BOOYAL.

In the Booyal district the cane making the best showing was the M. 1900 Seedling. Other varieties promising to cut good tonnages are H.Q. 285, D. 1135, Black Innis, and Q. 813.

Growers should pay careful attention to plant selection for these reasons: (1) Cane is maintained of good type if well-grown sets are selected; and (2) disease is checked if a survey is made before cutting. The word "sets" has been used; this is a Queensland term, and generally understood. The word "seed" should not be used, for it is not in common use, and has an unfamiliar sound to the grower.

The Booyal soils do not, on the whole, need such deep cultivation as the Isis soils. Farmers are advised not to cut down any more jungle (or rain forest) than they can possibly avoid. Well-timbered country generally means a country with a well-distributed rainfall. Another important phase of this is that these park-like belts of softwood, with the libellous name of "scrub," greatly add to the beauty of the landscape.

Growers in this district are advised to consider the use of wooden tramlines for haulage. A 3 by 2 hardwood tramline would last for years, be much cheaper than steel, and just as effective for horse work.

## MARYBOROUGH.

Heavy winter rains have checked considerably the cane in this fertile area. The tonnage, nevertheless, should be about the same as last year. The growers are wisely fertilising more than hitherto. This applies to all the cane districts. The work of manuring is carried on now entirely on investigations made of late years by the Bureau of Sugar Experiment Stations, and is, on the whole, very satisfactory.

The best cane variety in this district is Q. 813; H.Q. 285 is showing good crops also.

The river soil has been considerably affected by the recent floods, and is in an inferior condition. Light dressings of lime are recommended on river fields that are being ploughed this spring.

## PIALBA.

There are some very fair crops in the Pialba district, notwithstanding the soil has suffered a great deal from excessive wet.

Cane varieties doing well in this locality include H.Q. 285, Q. 813, M. 1900 Seedling, Q. 812A. There are two sports of Malabar which are making good growth also. When a "sport" of a variety is referred to, it is meant that the original cane has undergone a change, and this is generally indicated by a series of wide parallel stripes running the full length of the cane. Some sports, however, come from striped canes, and are themselves quite free of stripes. N.G. 40 Sport is one of these. Again, sporting may be observed by a number of obscure manifestations, such as resistance to disease, &c. However, in most cases, it is a striped cane appearing where the parent stool is unstriped. Sports, if planted, will always reproduce themselves, and are often higher in sugar content than the original though not so hardy.

**Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription —one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.**

# ENTOMOLOGICAL HINTS TO COTTON GROWERS.

By G. A. CURRIE, B.Sc., Entomological Branch.

A word in season just now regarding some insect pests of cotton may help to reduce the destructiveness of these pests during the coming year, and cotton-growers are advised of the desirability of whole heartedly observing the following recommendations:—

The corn ear worm which is well known to the cotton-growers as a destroyer of squares, flowers, bolls, and foliage, does considerable damage every year, but if certain precautions are adopted the losses inflicted by this pest will be much reduced.

A detailed description of all stages of this insect and its yearly life history are given in the bulletin "Cotton Growing in Queensland," published by the Department of Agriculture and Stock, and any cotton-grower desiring these details is referred to that publication.

In autumn and early winter the full-grown caterpillars descend into the soil under the plants on which they have been feeding and change into the pupal form in earthen cells. When warmer weather and spring rains arrive, adult moths emerge from the pupæ, pair, and lay eggs on weeds, which have sprung up after the rains.

Many experiments have shown that ploughing and harrowing the ground kills most of the pupæ in the soil. This ploughing has, of course, to be done before the moths have emerged about the end of August or September.

Obviously the advice at this point is *to destroy all the past seasons bushes early, and plough the fields in winter before moths are likely to have emerged, and so destroy overwintering pupæ.* This is especially necessary in the case of fields known to have been heavily infested with corn ear worm in the previous season.

During the season 1927-28 much damage was done by caterpillars hatching from eggs, laid by moths emerging from ratoon blocks, which had not been thoroughly cultivated. It is difficult to destroy all pupæ amongst cotton plants which are being ratooned, for many of the pupæ are situated near the roots, and even between the plants in a row so that only the most thorough cultivation can reach them. If any cotton is ratooned, this thorough cultivation to kill overwintering pupæ should be aimed at. On emergence in spring, moths lay their eggs on many weeds of cultivation and so breed up to enormous numbers ready to infest cotton or maize later on. The rate at which they breed can be imagined from the fact that each female moth may lay from 500 to 1,000 eggs during her short life.

The insect breeds continuously from September to about June in the districts inland from the coastal range, one generation following another. In the coastal districts breeding may be continuous throughout the year.

To counteract this breeding in spring all farmers should make a point of having no dirty fallows or weedy ratoon fields available as

breeding grounds for the first generation of caterpillars in September and October.

The spring generation is the one which has the most precarious outlook as to its feeding grounds, and so is the one most open to control by simply starving it out, as far as lies in the grower's power, by destruction of all spring weeds of cultivation.

When numbers have increased sufficiently to be destructive it is difficult to cope with the pest, as spraying or poison dustings, even if practicable, are expensive.

The situation can be summed up in general terms as follows:—

When ploughing is left till late and moths emerge in spring from infested grounds, they will lay their eggs on weedy fallows or dirty ratoon crops and increase rapidly in number so that their next and subsequent generations may be destructive to maize, cotton, &c.

When, however, ploughing of all previously cropped land is done in winter, and all weeds are kept down in September and October, not only will most of the pupæ be destroyed in the soil, but those that do emerge as moths will have difficulty in finding suitable food plants for their caterpillars. This will make the first, and probably all, subsequent generations for the year much smaller and consequently less destructive than they would otherwise be.

Each successive generation of caterpillars may, if conditions are favourable, become larger than the previous one, so that the earlier the cotton crop comes to maturity the more probably will it escape the most destructive brood of caterpillars.

The rapidly growing tender young plant in its squaring stage is the most attractive stage to the caterpillars, so the sooner this stage is past the more chance it has of setting a crop of bolls before the caterpillars become most numerous and destructive for the season.

Cotton plants with a sappy luxuriant habit of growth have been observed to be more liable to attack by corn ear worm than those with a slower growth, and with a more fibrous nature.

The different habits of growth are seen to be correlated with soil and climatic conditions, but sufficient evidence has not yet been accumulated to give recommendations about choosing soil types with relation to immunity from insect attack.

Besides helping in the matter of cultural control there are some natural controlling agents, which the farmer can assist in their war against the corn ear worm.

Wild birds and domestic poultry take heavy toll of caterpillars, so that all insectivorous bird life should be encouraged, while domestic poultry should be allowed the free run of the fields whenever possible. Some of the most useful birds in this connection are ibis, pee-wees (magpie lark), butcher birds, wagtails, swallows, and martins, while the much maligned crow, though a mixed feeder, can be very useful on occasions.

There are fifteen known insect enemies of the corn ear worm and probably many more will be found. Little can be done by the farmer to assist most of these, but there is one at least that can be encouraged.

This is a reddish-brown wasp (*Polistes schach*). It is about an inch long and one and one-half inches from wing tip to wing tip. It nests in hollow trees, in the lee of large fence posts, in old sheds, and under verandahs. It preys on caterpillars, slashing them and sucking the juices, so it should be protected as far as possible.

In some parts of the world small huts or shelters are built to encourage wasps of this type to build their nests, and Queensland farmers should at least prevent the destruction of these wasp nests unless they are a source of annoyance.

The recommendations with reference to possible injury by corn ear worm can now be summarised as follows:—

(1) *Cultivate early all soils which have grown crops the previous season so as to kill all overwintering pupæ in the soil before moths emerge in spring.*

(2) *Keep all fallows and ratoon crops clean during the spring months so that no feeding grounds for the first brood of caterpillars of the season are available.*

(3) *Plant cotton as early as possible so that the bushes will be well advanced before the pests have bred up to great numbers.*

(4) *Protect and encourage wild birds which prey on insects, and wasps which destroy the caterpillars.*

In connection with pink boll worm control, the following general recommendations are reiterated:—

(1) Destroy all previous seasons cotton bushes early; say, by middle of July.

(2) Cultivate early to help to destroy pupæ in cracks in soil or amongst rubbish on ground.

(3) Avoid ratoon or stand-over cotton which provides feeding grounds for the pests to carry them over the period before the annual cotton becomes available.

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## RED-FLESHED CAPE GOOSEBERRY.

Mr. R. M. Wise, of Vadencia, Buderim, recently visited this office, and on that occasion exhibited for our edification a red-fleshed variety of Cape Gooseberry somewhat larger in size than the common variety which grows wild over a considerable portion of the scrub lands of this State. From subsequent inquiries made it was ascertained that the plant was identical with the Chinese Bell flower (*Physalis franchetii*), a dwarf plant frequently of straggling habit and about 2 ft. in height. The seed pods towards the end of the season are decidedly ornamental, as they change from yellow to almost scarlet, particularly the base half.

The specimen exhibited by Mr. Wise was particularly handsome, being striped a brilliant scarlet toning down to an almost bronze red. This plant is really an ornamental type of Cape Gooseberry, the fruit slightly larger than the common yellow variety. Its flesh is more solid and its flavour of a pleasing acidity. As a fruit for preserving, or for similar purposes, it should meet the public taste and is well worthy of further cultivation.

The water-colour drawing by Mr. I. W. Helmsing, of the Entomological Division, is a remarkably good illustration of the fruit as delivered to us by Mr. Wise, and represents the beautiful colouring of both fruit and seed pod.

Plate 16.—A New Type of Cape Gooseberry (*Physalis franchetii*).
(From a water-colour drawing by I. W. Helmsing.)

*Photo.: H. W. Mobsby, Dept. Agriculture and Stock.*]

PLATE 17.—THEIR EXCELLENCIES SIR JOHN AND LADY GOODWIN IN THEIR GARDEN AT GOVERNMENT HOUSE.

*Photo.: H. W. Mobsby, Dept. Agriculture and Stock.*]

PLATE 18.—THE QUEENSLAND HOME OF SIR JOHN AND LADY GOODWIN,

Crowning the crest of one of the forested foothills of Brisbane's sheltering range. From the tower may be enjoyed a wonderful panorama of one of the most beautifully situated Capital cities of the Empire—a panorama of mountains, forests, city, river, and sea.

*Photo.: H. W. Mobsby, Dept. Agriculture and Stock.*]

PLATE 19. UNDER THE CEDARS, GOVERNMENT HOUSE, BRISBANE.

The home of Sir John and Lady Goodwin is surrounded with lawns, always half in sun and half in deep, cool shade. Encircling these again is a natural unspoilt forest, a sanctuary for furred and feathered friends. Beautiful woodland walks wind along the contours through corridors of gums, and help in making the Government House Domain a veritable garden of delight.

# A RECORD OF RURAL PROGRESS.

## SPEECH BY THE GOVERNOR.

**His Excellency the Governor, Lieutenant-General Sir John Goodwin, K.C.B., C.M.G., D.S.O., opened the Third Session of the Twenty-fourth Queensland Parliament on Wednesday, 25th July, and in the course of his Speech he reviewed the progress of country life in the State, and forecasted legislation that will have an important bearing on our rural industries. Subjoined are excerpts from His Excellency's Speech which are of especial interest to the agricultural community.**

### OPENING OF PARLIAMENT.

THE GOVERNOR'S SPEECH.

His Excellency, at the outset of his speech, said: "It gives me great pleasure to meet you at the opening of this, the third session of the twenty-fourth Parliament of Queensland. Since opening the second session of this Parliament on 24th August of last year, it has been my good fortune to travel over a considerable portion of the State of Queensland. In my various tours I have traversed more than 12,000 miles by road and rail, and the study of the many and varied conditions and industries of the country has been of intense interest, while the meeting with the people in both town and country districts has afforded me the greatest possible pleasure. Although even now I am acquainted with but a comparatively small portion of the State, yet my earlier impressions as to its amazing natural resources and future possibilities are more than fully realised. The cordial greetings which have been accorded to me everywhere have made a very lasting impression on me, and the expressions of loyalty to the throne and person of His Majesty have been universal. I invariably transmit such expressions of loyalty direct to His Majesty. I would take this opportunity of tendering to the people of Queensland, through you who represent them, my very sincere gratitude and thanks for the warm welcome which I have received from them in every part of the State which I have visited. I intend to use my utmost endeavours to extend my knowledge to every part of Queensland, and to become acquainted as fully as possible with all conditions, industries, and peoples."

#### The Sugar Industry.

His Excellency, after a brief reference to the satisfactory revenue account for the year ended 30th June, 1928, and to the ratification of the agreement between the Commonwealth and the States for the adjustment of Commonwealth and State financial relations, said that present indications pointed to the yield of sugar in Queensland for the current season being in the vicinity of 500,000 tons. The industry had made great progress during recent years. In 1920 the area cultivated for cane was 162,000 acres, while to-day some 300,000 acres were under cultivation, and the number of growers of cane had increased by 70 per cent. That the industry was proceeding on progressive lines was reflected in the amount of cane required to make a ton of raw sugar, which was now 7.5 tons as against 9.2 in 1908.

The principal agricultural products of Queensland, which had been brought under the system of co-operative marketing inaugurated by the Government, represented an annual value of approximately £12,000,000 sterling, which was two-thirds the value of the agricultural production of the State. The splendid season experienced in agricultural areas had brought about a greatly increased production, exceptional wheat yields being secured on the Darling Downs as a result of the favourable conditions prevailing in the spring. This year's maize harvest would be a good one, while the expansion of trade in the peanut industry was most marked. The past financial year had shown record returns in the dairying industry.

#### Wool and Cotton.

The total yield of cotton this season would exceed that of last season, despite serious losses experienced from severe floods and heavy rains at critical stages of

the development of the crop. Growers in the main cotton areas were optimistic as to the future of the industry, and it was considered that the acreage for the coming season would approximate that of the present season, and might even show an increase.

The recently constituted Board of Agriculture had made a survey of agricultural activities in the State, and plans were now well advanced towards their co-ordination. The wool industry was receiving careful attention from the Government. Over the past five years it had provided an average of about 60 per cent. of the exports from the State. Unfortunately, of late years the seasonal conditions throughout a large proportion of the sheep belt of Queensland had been unfavourable. Notwithstanding this temporary setback, it was gratifying to note that there were still 16,500,000 sheep depastured on the lands of the State. With the advent of good seasons, therefore, the State would soon be stocked again to its normal carrying capacity of 21,000,000 sheep.

**Pastoral Development.**

Already a great amount of most valuable work had been accomplished by the Land Administration Board, which was appointed on 1st February. Grazing selection tenures exceeding 1,000 in number, and comprising an area of more than 10,000,000 acres, had been adjusted on the recommendation of the board; new leases for twenty-eight years had been granted, and moderate rents had been fixed in all cases.

The policy of the Government was to make available expiring pastoral leases for settlement by grazing farmers in economically sound areas. Already five large expired pastoral leases, covering an area of 550,000 acres, had been opened for selection, and all the land had been selected. A number of other expired or expiring pastoral holdings were now being subdivided, and would be released for settlement as early as practicable. While pastoral leases would not be renewed in respect of good quality sheep lands, situated near railways, consideration would be given to any pastoralist who was prepared to develop lands more remotely situated. Already eighteen pastoral development leases had been granted, comprising an area of nearly 6,000,000 acres.

Following on the report of the Beef Cattle Industry Commission, it was the intention of his advisers to introduce a Land Acts Amendment Bill to give effect to certain recommendations of the Commission in regard to land tenures.

**The Dawson Valley Scheme.**

The Dawson Valley irrigation project had steadily advanced during the past year. Over a hundred settlers had taken up blocks comprising 15,000 acres, and many had already received substantial returns from their crops. Substantial progress continued to be made by the Prickly-pear Land Commission in the control of the prickly-pear pest. The Main Roads Commission had now completed 850 miles of road and over 12,000 lineal feet of bridges, and had 112 miles of road and 3,000 feet of bridges under construction, the present rate of road construction being approximately one mile per working day. The gross revenue derived from forestry during last financial year amounted to £642,587, as compared with £674,430 for the previous year, the cash surplus over all costs of the department, including new investments in reforestation, totalling £169,750. During the year over 1,000 acres of new softwood plantation were established, and 5,580 acres of hardwood and cypress pine forests treated for natural regeneration.

**Extension of Education.**

Brief reference was made to the four travelling schools, the increase in the number of rural schools, and the development of project schemes and school clubs. It was the intention of his advisers, His Excellency said, to inaugurate in the larger centres of population a system of intermediate schools, into which pupils who had reached the age of approximately twelve years would be drafted, and where they would receive a course of super-primary education that would include training in the manual and domestic arts and in elementary science. The establishment of these schools would relieve the overcrowding which sometimes resulted from the rapid increase in population, and would secure manual dexterity while preparing the way for entrance into the skilled trades and into the various types of secondary schools.

Recognising the necessity for dealing more effectively with acute cases of eye trouble occurring among school children in the blight areas of the State, his advisers had decided to establish in Brisbane an ophthalmic hospital, where these cases would receive expert treatment.

The education of the children would receive attention while they were in the hospital. It was expected that the hospital would be in operation before the close of the current year. The system of dental inspection was also being extended, and arrangements were now being made for a travelling rail motor clinic.

**The Sessional Programme.**

Among other proposals which would be brought before Parliament, added Sir John, would be the following:—

A Land Act Amendment Bill.
A Hospitals Act Amendment Bill.
An Aboriginal Protection and Restriction of the Sale of Opium Acts Amendment Bill.
A Traffic Acts Amendment Bill.
A State Children Acts Amendment Bill.
A Guardianship of Infants Amendment Bill.
A Main Roads Acts Amendment Bill.
A Farm Produce Agents Act Amendment Bill.
A Fruit Marketing Organisation Acts Amendment Bill.
A Primary Producers' Organisation and Marketing Act Amendment Bill.
A Stock Foods Act Amendment Bill.

## THE GROS MICHEL BANANA.

By S. E. STEPHENS, Inspector, Diseases in Plants.

Some publicity has lately been given to the variety of banana known as the Gros Michel, also called, in different localities, the Fiji and the Jamaica. The variety is a tall-growing one, reaching as high as 25 ft. to 30 ft. when planted on suitable soil. The bunch is large and the fruit of an even grade and of the largest size.

Before a grower commits himself to an area of Gros Michel bananas he would be wise to consider the pros and cons connected with the growing of this variety.

In the first place, the land selected for growing them must be of the very best. Land which will grow only a fair average Cavendish banana will be quite useless for Gros Michel. The ideal land is a rich alluvial creek flat which has carried dense tropical scrub. Being subject to flood is no disadvantage provided it is only back-water which can drain off quickly. Bananas are only damaged by water when it lies on them for several days with the sun beating down on it.

Shelter must also be considered. Being a tall-growing banana it must be well protected from the prevailing winds by belts of scrub, preferably on three sides of the patch. The Gros Michel has several points in its favour, the chief ones being large bunches and large fruit. The fruit is also said to be of a superior carrying quality to the Cavendish, whilst the flavour is preferred by many people.

Whilst it is an advantage to have a consistently large grade of fruit there are a number of points which make the Gros Michel unsuitable for general cultivation at the present time.

Firstly it is subject to Panama disease—a disease which is known to be prevalent throughout the State, and which caused a large amount of havoc amongst the tall-growing varieties of bananas some years ago.

Being so tall it is impossible to prop a plant with a heavy bunch and consequently a number of bunches are lost through the plants falling out.

The bunch being so high from the ground makes it a difficult matter to treat for rust. A statement was recently made in the Press that the Gros Michel is not affected with rust, but this is incorrect. It is affected almost as badly as the Cavendish although perhaps not in quite such large numbers. The only method of treatment is to use a spray pump fitted with a long extension rod.

Harvesting the bunches is somewhat difficult to the beginner. The easiest method is to nick the stem of the plant on the side nearest the bunch, at a point as high as can be reached, with a sharp shovel. This will allow the top of the plant bearing the bunch to bend over slowly until it is within reach, when the bunch can be eased gently to the ground. The fruit is often so large that the novice finds some difficulty in packing it into the standard 1½-bushel case. To overcome the difficulty first pack a row of fruit down the centre of the case. This will raise the centre so that the two rows then packed in the ordinary way will just meet over the first row, making the centre of the pack hog-backed.

Plate 20.—A Fine Patch of Gros Michel Bananas—Mr. P. Monaghan's Plantation at Kennedy, North Queensland.

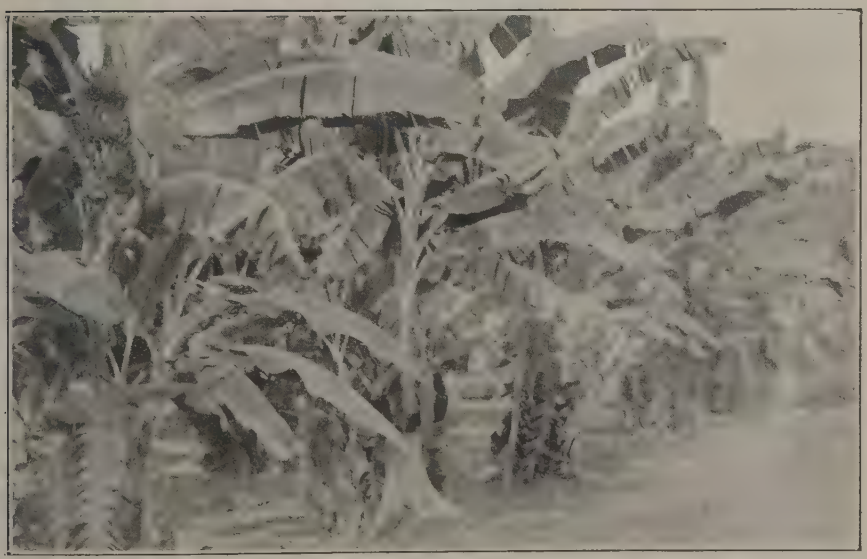

Plate 21.—Twelve Months' Old Gros Michel Bananas, showing Remarkable Development under our Northern Conditions.

## QUEENSLAND'S WEALTH AND PROGRESS.

The Registrar-General (Mr. Geo. Porter) has made available the following facts concerning manufacturing in Queensland.

A factory, statistically speaking, is regarded as an industrial establishment employing four or more hands or using machinery worked by power other than horse or hand.

During the year ended 30th June, 1927, there were 1,877 of such factories in Queensland—a decrease of 20 on the number in the previous year 1925-6. On the average 48,133 hands (of which 40,493 were males and 7,640 females) were employed, as compared with 50,496 (42,525 males and 7,971 females) during the previous year. It is interesting to note that the percentage of females employed in 1926-7 was 15.9 as compared with 15.8 in 1925-6.

The employees mentioned above include working proprietors and clerks, &c., as well as manual workers. These have also been included in the following calculations.

The amount of wages paid was £9,588,138 for the year or £199.21 per employee, as compared with the wages bill of £9,821,960 or £194.51 per employee during 1925-6.

Goods to the value of £41,327,767 were produced during the year from raw materials worth £23,912.241. In 1925-6 the value of output was £45,900,668 and raw materials used £26,710,520. Output per employee was, therefore, £859 in 1926-7 and £910 in 1925-6.

The value added by process of manufacture—i.e., the value of output less materials used, fuel, light and power, repairs, &c.—was £15,320,068 for 1926-7 and £16,197,764 for 1925-6, an average of £318 and £321 per employee respectively.

The value of land and premises was £8,645,580 (1925-6), £8,155,604), whilst plant and machinery was valued at £16,043,679 in 1926-7 and £15,226,566 in 1925-6.

For purposes of comparison, the following list of principal articles manufactured is now given. 1925-6 figures in all cases appear in parentheses:—

| | | |
|---|---|---|
| Leather (lb.) | 3,425,504 | (4,002,757) |
| Soap (cwt.) | 84,914 | (94,267) |
| Bricks (1,000) | 22,543 | (24,733) |
| Meat, frozen, preserved, &c., at meatworks (lb.) | 107,154,543 | (215,846,728) |
| Bacon and ham (lb.) | 17,971,692 | (18,013,086) |
| Butter (lb.) | 49,054,847 | (60,491,765) |
| Cheese (lb.) | 9,243,279 | (12,565,572) |
| Confectionery | £297,282 | (£362,269) |
| James and jellies (lb.) | 5,570,172 | (5,038,934) |
| Pulped fruit (lb.) | 373,642 | (416,864) |
| Preserved fruit (lb.) | 6,244,427 | (3,853,051) |
| Flour (tons) | 52,959 | (61,587) |
| Bran and pollard (bush.) | 2,082,538 | (2,611,659) |
| Sugar, raw (tons) | 457,914 | (479,023) |
| Aerated waters (doz.) | 2.682,822 | (2,890,177) |
| Beer and stout (gal.) | 6,675,966 | (7,045,713) |
| Boots and shoes (pairs) | 728,279 | (767,104) |
| Timber, sawn (sawmills only) (sup. ft.) | 129,780,650 | (131,662,444) |

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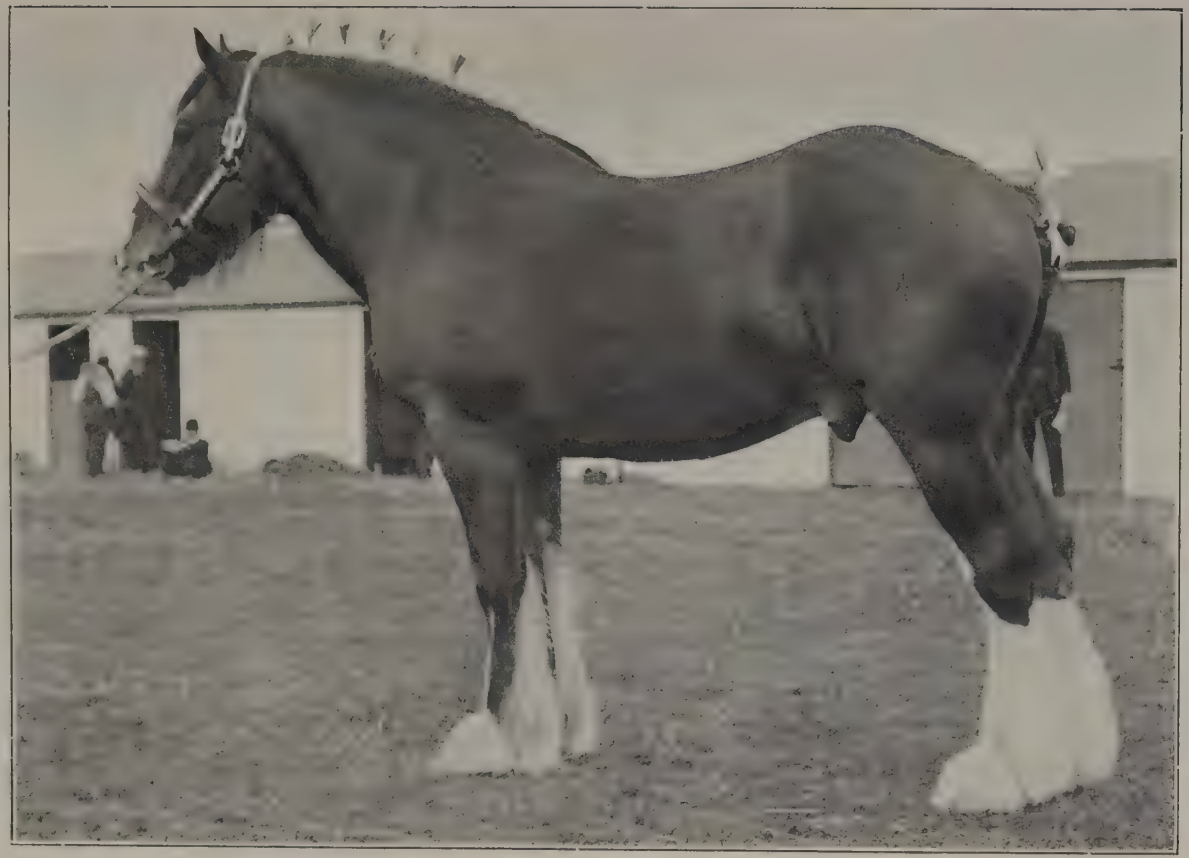
## THE MINISTER IN NEW ZEALAND.

### AMONG THE STUD STOCK BREEDERS.

New Zealand has shown an expansion in the cattle-raising industry, especially in relation to dairying, that has few parallels in recent years. The favourable climate, co-operative organisation among producers, and close attention to breeding, selection, and the general principles of animal husbandry, have all contributed to the placing of the Dominion in the position of one of the largest exporters of dairy products in the world.

In the course of his tour through New Zealand early in the year, the Minister for Agriculture and Stock (Mr. W. Forgan Smith) came in contact with many of the leading Dominion stud stock breeders. He also saw the results of their skill and judgment, as expressed in the quality of animals running on their home pastures.

Through the courtesy of Mr. Forgan Smith we are able to reproduce photographs of some of the animals he saw on his tour, and the series now presented is selected from his interesting pictorial record of his journeyings through the Dominion.



[*Photo.: L. G. Hahn, Dunedin, N.Z.*.

PLATE 22.—THE CLYDESDALE IN NEW ZEALAND. "BRILLIANTSHINE" (BRILLIANT AGAIN—LADY SCOTLAND), 1ST AT THE NEW ZEALAND ROYAL SHOW, THE PROPERTY OF THOMSONS LTD., WAI-RONGOA STUD, DUNEDIN, NEW ZEALAND.

[*Photo.: L. G. Hahn, Dunedin, N.Z.*]

PLATE 23.—A NEW ZEALAND CLYDESDALE, "SCOTLAND'S VICTOR" (SCOTLAND'S VICEROY—BRILLIANT IV.), THE PROPERTY OF THOMSONS LTD., WAI-RONGOA STUD, DUNEDIN, NEW ZEALAND.

PLATE 24.—REPRESENTATIVES OF OCHTERTYRE STUD OF CLYDESDALES, ALLANTON, OTAGO, NEW ZEALAND.

*Left to right:* Scotland's Douglas (imp.), (20682)—sire, Dunure Reserve (18718); g. sire, Bonon of Buchlyvie (11263); dam, Southley Lass (38684), by General Hunter (12161). Brunstane Duplicate (imp.), (2049)—sire, Dunure Footprint (15203); dam, Marseillaise (35946), by Mercutio (11431). All Scotch (1909) (imp. in utero)—sire, Scotland's Sample (20979); dam, Scotland's Queen (55047), by Dunure Endeavour (19419).

PLATE 25.—ARISTOCRATS OF THE OCHTERTYRE CLYDESDALE STUD, ALLANTON, OTAGO, NEW ZEALAND.
Some of the animals paraded for Mr. Forgan Smith's inspection in the course of his recent New Zealand tour. The four from the right are 3-year-old fillies.

Plate 26. "Dominion Director," One of the Stud Animals on the Ruakura State Farm of Instruction, Hamilton, New Zealand.

Plate 27.—"Holly Oak Beauty Knight" (19 Months Old).
Bred at the Ruakura State Farm from the highest producing strain in New Zealand. His stance before the camera disguises somewhat his true quality as a stud animal.

Plate 28.—"Dominion Golden Floss"—A Representative Jersey at the Ruakura Farm of Instruction, Hamilton, N.Z.
Holder of the record under semi-official test, season 1926-27: 663 lb. butter fat in 365 days, age 2 years 9 months.

Plate 29.—"Dominion Advance," one of the Jersey Sires at Ruakuka State Farm, New Zealand.

Plate 30.—"Dominion Avis."
Record under semi-official test, season 1926-27: 560 lb. butter fat in 365 days, age 3 years 9 months.


PLATE 31.—THE POINTS OF A DAIRY COW.

An illustration of the points of an ideal dairy cow. As no dairy cow ever reaches the ideal it would be incorrect to suggest that this cow is ideal, but she is not far short of it; 79.4 lb. of milk was her daily production. She is a gold medal winner and with a long list of show-ring successes. This diagram gives something like an exact idea of the points of the ideal dairy cow.

# DAIRYING IN QUEENSLAND.

**The Minister for Agriculture and Stock (the Hon. W. Forgan Smith) announced last year the appointment of a Departmental Committee to make a survey of economic facts relating to some important phases of agriculture in Queensland.**

**The Committee has met from time to time and has collected and collated much useful data. The Minister has previously announced his intention of conveying some conclusions based upon this data to producers through a series of Bulletins.**

**In the first Bulletin, the text of which appeared in the June "Journal," the present conditions in the industry in Queensland were reviewed briefly, and in this (the second Bulletin) three outstanding factors are elucidated and stressed, namely:—**

**The need of herd improvement;**

**The importance of feeding; and**

**The necessity of herd testing.**

**This Bulletin not only sets these forth as meriting the immediate attention of those engaged in the industry, but also extends a standing invitation to dairymen to avail themselves of the helping hand of the Department and of the facilities which it offers.—Ed.**

## HERD IMPROVEMENT.

### IMPROVED DAIRY SIRES.

An important factor for success in dairy farming is the use of approved dairy sires. Good dairy cows are far too scarce, and it would be impossible for dairy farmers to purchase a sufficient number of them to replace all the unprofitable cows at present in their herds.

#### Selection and Breeding.

The means of eliminating the unprofitable cow is by breeding from selected dams mated with approved sires.

To employ unprofitable cows or rear heifers from them retards the progress of the industry.

The dairy farmer who continues to milk and breed from unprofitable cows will not secure a return commensurate with the capital invested and labour involved.

Every breed of improved live stock has been developed by well-defined laws of selection and breeding.

Under the influence of skilful selection, breeding, and feeding, the dairy cow has developed remarkably, both in type and functions, and differs greatly in general characteristics from the foundation stock from which the modern type has been evolved. For example, the robust constitution and productive characteristics of the Darbalara strain of dairy cattle are outstanding features in the evolution of a modern dairy cow, and are a tribute to the work of the late J. T. Cole, a master mind in dairy stock breeding. The work of other noted stud masters is also evident by the number of high class stock in all our dairy breeds.

**Dairying ranks in importance among farm activities of Queensland next to sugar-growing on the basis of aggregate value.**

It must be remembered that pedigree alone does not guarantee that a sire will beget heavy-producing cows, and show ring points in themselves are not always reliable guides. Consequently, the chief considerations in selecting a sire to head a dairy herd are the milk and fat production records of progenitors on the paternal and maternal sides, and that combine these qualities with type and conformation.

## THE BETTER BULL SCHEME.

The Minister for Agriculture, Hon. W. Forgan Smith, recognising the necessity for improving the average production of the cows comprising the dairy herds of this State, has inaugurated the Dairy Cattle Improvement Subsidy Scheme. The conditions under which the subsidy is made available to registered dairy farmers give prominence to the chief factors in increasing the production of the cows comprising the dairy herds, viz., herd testing, culling, and the use of improved dairy sires.

This scheme came into active operation at the end of 1925, and particulars of it are set out in Appendix A attached hereto. It is meeting with an appreciative response from progressive dairy farmers throughout the State.

**Attention to herd improvement will enable the dairyman to meet competition in the world's markets.**

### Records Favour the Better Bred Dairy Sire.

The influence of a sire may either increase or decrease the production of his progeny. Herd testing results disclose the prepotency of a sire bred on a production basis.

The work carried out by officers of the Dairy Branch of this Department embraces the testing for butter-fat production of females of the various dairy breeds, in order to qualify for entry in the respective herd books.

Plate 32.—On Queensland's Dairy Lands: A Typical Farm Scene.

**The tabulated production records of the progeny of improved dairy sires tells the story in favour of better-bred dairy bulls.**

Following are excerpts from actual Departmental records:—

Sire A.

| Progeny. | Production. lb. butter-fat. | Period. |
|---|---|---|
| No. 1 | 671·64 | 273 days |
| No. 2 | 623·36 | „ |
| No. 3 | 499·98 | „ |
| No. 4 | 498·23 | „ |
| No. 5 | 488·48 | „ |
| No. 6 | 463·02 | „ |

This sire has ten daughters in the Herd Book Register.

Sire B.

| Progeny. | Production. lb. butter-fat. | Period. |
|---|---|---|
| No. 1 | 529·23 | 273 days |
| No. 2 | 520·98 | „ |
| No. 3 | 508·31 | „ |
| No. 4 | 481·69 | „ |
| No. 5 | 398·22 | „ |
| No. 6 | 395·25 | „ |

This sire has ten daughters in the Herd Book Register.

**Dairymen are cordially invited to inquire into and avail themselves of the Departmental Scheme for Herd Improvement and Herd Testing.**

Sire C.

| Progeny. | Production. lb. butter-fat. | Period. |
|---|---|---|
| No. 1 | 502·35 | 273 days |
| No. 2 | 439·76 | „ |
| No. 3 | 435·38 | „ |
| No. 4 | 419·84 | „ |
| No. 5 | 416·83 | „ |
| No. 6 | 415·41 | „ |

This sire has sixteen daughters registered in the Herd Books.

It is to be noted that the above groups represent three distinct dairy breeds.

It is obvious that the Better Bull Scheme of the Department of Agriculture and Stock exerts a directly beneficial influence on the industry.

**For high production adequate feeding is essential.**

## IMPORTANCE OF FEEDING.

The need for systematic effort to improve the quality and volume of production of the average dairy cow in Queensland is plainly evident and calls for the close attention of all engaged in the industry.

This was borne out by first-hand information collected recently from practical dairymen in the Darling Downs and Lockyer Districts, whose holdings ranged from 150 to 700 acres.

Dairy cows cannot be expected to produce a normal volume of milk unless they are suitably fed.

Any curtailment of the normal lactation, whatever the cause, reduces the return and prevents continuity of supplies so essential to orderly marketing.

### Introduced Grasses and Fodder Crops.

The variation in climate and environment under which dairying is carried on calls for a careful study of local conditions to determine the most suitable exotic grasses and fodders to be utilised solely, or as supplementary to indigenous pastures. Scrub lands, almost without exception, should be laid down under Rhodes, paspalum, prairie, Kikuyu, and other suitable grasses. Appendix B contained herein furnishes a generalised list of grasses and crops for coastal, tableland, and inland districts.

There are few directions in which thoughtful planning on the part of the dairy farmer would be rewarded more abundantly than making provision for the proper feeding of his stock. Bulletin No. 3 D will deal fully with this question. There is submitted here, however, information (*see* Appendix B) respecting grasses and fodders suitable for Queensland conditions.

**Dairy farmers have organised manufacturing and marketing. Why not organise for better herds?**

## HERD TESTING.

### The Need for Efficient Management.

Economic change has brought with it conditions that necessitate the application of more exact business methods in the conduct of dairy farming.

Is is essential that the dairy farmer should examine critically his business practices in order that he may eliminate the unprofitable and less profitable sections of his enterprise.

Dairy farming is a complex business, and is subject to influences which do not operate in an ordinary commercial undertaking. The dairy farmer cannot always accomplish what he desires or what he sets out to attain, for weather conditions and other factors affect the results of his enterprise.

**We must increase our butter-fat production on the basis of keeping cows of higher producing capacity.**

It will be found, however, by investigation into management that sectional losses can be reduced and payable activities increased.

Ability to manage contributes largely to success in dairy farming. It is a diversified business and calls for more skill and administrative ability than the farming of one crop.

The successful dairy farmer must have a sound knowledge of agriculture, including the rotation of crops and the conservation of fodder. He must also be well versed in the breeding, feeding, and management of dairy live stock.

**The yield of the individual cows in the dairy herd determines the cost of production, and no single factor has a more important bearing on the financial success of the dairy farmer.**

### Profit Factors.

It has been argued that increased production means a market handicap, but economic facts disprove this contention. The profits from dairy farming depend upon two main factors—(*a*) The volume and cost of production; and (*b*) the price which the dairy farmer receives for his produce.

### Elimination of Unprofitable Cows.

The proportion of unprofitable cows present in many dairy herds is unduly high, and where systematic herd testing is not carried out, many of them remain unidentified or even unsuspected.

Every dairy farmer who hopes and works for better returns must realise the practical benefit of herd testing in the quest for increased production.

Where a large herd of cows is kept, and the income is sufficient to meet general expenses, the dairy farmer does not usually endeavour to find out the cows that are unprofitable. If the individual yields are low, milk production is not profitable. Large numbers of cows of low average yield, instead of increasing profits, actually increase losses.

**Increased efficiency and quality of the product are far more important than an increase in the number of dairy cows in the herd.**

To ensure efficiency it is necessary to ascertain the cows that are paying their way, so that the unprofitable animals may be culled and replaced with profitable ones. By this method average fat-production of dairy herds can be substantially increased without undue cost.

The results of the work of the herd-testing officers of the Department of Agriculture and Stock are of a value that is difficult to estimate. They indicate which of the cows in the herd return sufficient to cover feed and labour costs and provide a reasonable profit.

The unprofitable animal consumes food and gives inadequate return. Culling removes this heavy burden of maintaining non-paying animals.

**Herd-testing is the only sure means of selecting the dam from which heifers are to be bred in order to maintain and improve the herd standard.**

### Lessons from Official Herd Testing Records.

The following impressive figures illustrate the extreme variation between the profitable and the unprofitable herds, judged by the test of monetary return:—

| Season 1926-1927. | Com. Butter. | Price per lb. | Value. |
|---|---|---|---|
| *Herd Basis*— | Lb. | s. d. | £ s. d. |
| A. Production of herd tested for full milking period (30 cows) .. .. .. | 7,830 | 1 3 | 489 7 6 |
| B. Production of herd tested for full milking period (30 cows) .. .. .. | 3,990 | 1 3 | 249 7 6 |
| Difference in favour of herd A .. .. | 3,840 | .. | £240 0 0 |

| | Com. Butter. | Price per lb. | Value. |
|---|---|---|---|
| *Individual Cow Basis*— | Lb. | s. d. | £ s. d. |
| A. Average production per cow of highest herd tested for full milking period .. | 261 | 1 3 | 16 6 3 |
| B. Average production per cow of lowest herd tested for full milking period .. | 133 | 1 3 | 8 6 3 |
| Difference per cow in favour of herd A .. | 128 | .. | £8 0 0 |

Even in the best herds unprofitable animals are still to be found. Following are the production figures of the highest producing herd of thirty (30) cows tested by the Department:—

| Season 1925-1926. | Com. Butter. | Price per lb. | Value. |
|---|---|---|---|
| *Herd Basis*— | Lb. | s. d. | £ s. d. |
| A. Production of herd for full milking period, (30 cows) .. .. .. .. .. | 7,170 | 1 3 | 448 2 6 |
| B. Average yield of cows in same herd for full milking period .. .. .. | 239 | 1 3 | 14 18 9 |
| *Individual Cow Basis*— | | | |
| C. Highest individual yield for full milking period .. .. .. .. .. | 431 | 1 3 | 26 18 0 |
| D. Lowest individual yield for full milking period .. .. .. .. .. | 156 | 1 3 | 9 16 0 |
| Difference between C and D .. .. | 275 | .. | 17 3 9 |

Other Departmental records show that a number of herds have an average production equivalent to 260 lb. of commercial butter in 273 days, while individual animals in herds have greatly exceeded this quantity.

The Australian record is 1,888 lb. of commercial butter in 365 days, which is also a world's record.

The Pure Bred Herd Book Societies require that in the case of a mature female the production must be 340 lb. of butter-fat in 273 days, the equivalent of 400 lb. of commercial butter.

**A REASONABLE OBJECTIVE.**

**An average yield of 260 lb. of commercial butter per cow per year is not beyond early achievement. The Department of Agriculture and Stock asks for the co-operation of all engaged in the industry to reach this objective.**

**Its attainment means a greater measure of prosperity to all concerned.**

The figure (260 lb.) is the average annual production between the present average yield (120 lb. commercial butter) and the standard (400 lb. commercial butter) set down by the Pure Breeders' Association.

## Queensland's Average Production Must be Increased.

The average yield per cow in Queensland is below that of some competing dairying countries, and it is essential that the present average production of butter-fat be materially increased to permit of a profitable return to all engaged in the industry.

There does not appear to be any insurmountable reason why this result should not be achieved by (1) breeding from the best producing stock; (2) better feeding; (3) systematic herd testing.

**The Department of Agriculture and Stock invites the cordial co-operation of dairymen and their organisations in attaining the abovementioned reasonable objective which would mean—**

**More money to the farmer.**

**Better conditions in the Industry.**

**Benefit to Queensland.**

Individual butter-fat records have shown many dairymen how to increase the production of their herds, and have assisted others who were really in earnest, to add substantially to their income.

The herd-testing scheme of the Department of Agriculture and Stock provides for the testing of dairy herds free of charge.

**Have you availed yourself of this service?**

## Summary of Work Accomplished.

Herd testing commenced in Queensland in the year 1910, and the Department is desirous of interesting an increasing number of dairymen in the potentialities of this practice. The following figures summarise the work accomplished:—

| | |
|---|---|
| Number of cows tested 1910 to 30th June, 1921 .. .. | 50,000 |
| Number of cows tested for year ending June, 1922 .. .. | 4,000 |
| Number of cows tested for year ending June, 1923 .. .. | 4,500 |
| Number of cows tested for year ending June, 1924 .. .. | 6,000 |
| Number of cows tested for year ending June, 1925 .. .. | 8,500 |
| Number of cows tested for year ending June, 1926 .. .. | 15,701 |
| Number of cows tested for year ending June, 1927*.. .. | 5,016 |
| | 93,717 |

* An abnormally dry year.

From the subjoined table it will be seen that there was a considerable variation in production in the several dairying districts of the State. The figures indicate that the system of animal husbandry practised on the Darling Downs is apparently superior to systems in vogue in other dairying regions where seasonable conditions, particularly in winter, are less harsh. They would also suggest that Downs dairymen possess a better class of stock. It is a common experience in every country that where the conditions of rural industry are harder, efficiency is greater. Climatic conditions are probably easier in other districts of Queensland than on the Darling Downs. Yet the Downs' production records show up more than favourably by comparison. There is an impressive moral in this that a study of the table below makes quite obvious.

The district figures are—

| | 1924-1925. | | | | 1925-1926. | | | |
|---|---|---|---|---|---|---|---|---|
| | No. of Herds from which averages have been computed | Average daily production of milk. | Average fat. | Average daily production of butter fat. | No. of Herds from which averages have been computed. | Average daily production of milk. | Average fat. | Average daily production of butter fat. |
| | | lbs. | Per cent. | | | lbs. | Per cent. | |
| Darling Downs .. | 219 | 19·72 | 4·0 | ·79 | 130 | 18·5 | 3·86 | ·71 |
| South Burnett .. | 109 | 18·54 | 4·06 | ·75 | 109 | 14·9 | 4·3 | ·64 |
| West Moreton .. | 72 | 17·46 | 4·12 | ·72 | 98 | 15·7 | 4·4 | ·69 |
| Central Burnett .. | 59 | 15·86 | 3·93 | ·62 | 20 | 14·8 | 3·95 | ·58 |
| North Coast .. | 138 | 15·25 | 4·1 | ·62 | 140 | 15·3 | 3·9 | ·59 |

## A Concluding Argument.

Actual figures speak eloquently. Take, for example, a herd of thirty (30) cows, the average production of which is equal to the present Queensland annual average of 120 lb. commercial butter. At 1s. 3d. per lb. commercial butter its production would be worth £225. A herd of the same number averaging in annual production 260 lb. commercial butter—the quantity set out in this Bulletin as a reasonable objective for the Queensland dairyman—would return, with the product at the same price, £487 10s., **representing an increased return of £262 10s.**

## APPENDIX A.

## DAIRY CATTLE IMPROVEMENT SUBSIDY SCHEME.

Subject to the conditions hereafter mentioned the Minister for Agriculture will make available to the approved purchaser of any such bull as complies with the prescribed conditions a subsidy of 50 per cent. of the purchase price, provided such subsidy shall not exceed £50. The subsidy will be available to the approved purchaser of an eligible bull at public auction, and the subsidy shall also apply in the case of private sale, provided, however, that the approval of the Minister is first obtained, and that both the vendor and purchaser make the necessary statutory declarations to meet the requirements of the Minister.

The subsidy is available in such areas of the State as are proclaimed under "*The Dairy Produce Act of* 1920."

### Conditions.

1. The bull must have passed the tuberculin test by a veterinary officer within three months prior to date of sale.

2. The bull must be in good health, well grown, and true to type.

3. The bull shall be registered in a recognised Herd Book or be eligible for registration.

4. The bull shall be not less than twelve months and not more than six years old, provided the Minister may approve of the purchase of an older bull which has sired high-producing females on official test.

5. The vendor of any bull three years old and over must produce evidence of fertility in the preceding year.

6. The vendor of any bull shall produce concerning such bull a declaration of health on a form to be supplied by the Department of Agriculture and Stock.

7. The bull shall be the progeny of an approved sire and an officially tested dam which has reached the undermentioned butter-fat standards during 273 days' milking:—

| | |
|---|---|
| 2 years or under .. .. .. | 230·5 lb. butter-fat |
| 3 years or under .. .. .. | 267 lb. butter-fat |
| 4 years or under .. .. .. | 303·5 lb. butter-fat. |
| 5 years or over .. .. .. | 340 lb. butter-fat. |

Add 1/10 lb. butter-fat for each day over the year indicated up to five years.

If a cow or heifer at a first test fails to reach the standard but subsequently attains it as set for her, her progeny may upon decision of the Minister thereby be rendered eligible.

8. The purchaser's application for subsidy shall be made on a form supplied by the Department of Agriculture and Stock. Any bull in respect of which the purchaser has received a subsidy as aforesaid shall, if required, be made available for the use of other dairymen, at a fee not exceeding 10s. per cow. In the case of bulls under two years of age at date of purchase the owner need not accept more than ten outside cows during the first year nor more than fifteen outside cows for bulls two years or over. In all cases of applications for service of outside cows preference is to be given to cows which have been subjected to a butter-fat test.

9. The purchaser of a bull shall have the right to refuse the service of such bull for any cows which he may have reason to believe to be suffering from disease, provided that the owner of such cows is unable to produce a certificate of a qualified veterinary surgeon to the effect that such cows are free from diseases.

10. The purchaser shall submit to the Department of Agriculture and Stock at the expiration of twelve months after purchase and at intervals of twelve months thereafter (*a*) a declaration of health of the bull on a form procurable at the Department of Agriculture and Stock and (*b*) signed statements from the owners of all outside cows served and dates of service in accordance with conditions outlined above. (*c*) The purchaser shall immediately report to the Department of Agriculture and Stock if the bull is in ill-health from any cause whatever or if such bull goes out of his possession or supervision.

11. The bull shall be kept under conditions satisfactory to the Department of Agriculture and Stock.

12. In the allocation of subsidy by the Minister preference will be given to prospective buyers of eligible bulls who have submitted their herds to a butter-fat test under the herd-testing scheme of the Department of Agriculture and Stock.

13. It shall not be permissible for the owner of a bull who has received a subsidy to resell the animal without the sanction of the Minister.

14. Any purchaser of a bull who receives a subsidy and who commits a breach of any of these provisions shall be liable to forfeit an amount not exceeding £10.

## APPENDIX B.

### DAIRY FODDER CROPS RECOMMENDED FOR USE IN QUEENSLAND.

| Crop. | Purpose for which Sown. | When to Sow or Plant. | | | Distance of Rows Apart. | Distance between Plants. | Quantity Seed per Acre if Drilled. | Quantity Seed per Acre if Broadcasted. | Approximate Period of Growth. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Coastal Districts. | Tableland Districts. | Inland Districts. | | | | | | |
| | | | | | Ft. In. | Ft. In. | | | Months. | |
| Barley, Cape | Green feed | Mar. to June | Mar. to July | Mar. to June | .. | .. | 1 bus. | 1½ bus. | 2 to 4 | Useful as a green fodder in its early stages alone or in conjunction with early maturing legumes. |
| Barley, Skinless | Hay | Mar. to June | Mar. to July | Mar. to June | .. | .. | 1 bus. | 1½ bus. | 2 to 4½ | Forms a useful fodder crop, also a fine quality hay; may be employed in conjunction with early and late maturing legumes. |
| Canary Seed | Hay and grain | .. | May to June | May to June | .. | .. | 15 lb. | .. | 4½ to 5 | Makes a fine stalked hay and is valuable as a grazing off crop. |
| Clovers | .. | .. | .. | .. | .. | .. | .. | .. | .. | Should be grown in pastures where possible. |
| Cocksfoot | Pasture | .. | Apr. to May | .. | .. | .. | .. | 1½ bus. | .. | Suitable only in certain temperate tableland districts within coastal areas. |
| Cow Cane | Cattle food | Sep. to Dec. | .. | .. | 5 0 | 1 6 | 5,800 sets | .. | 7 to 8 | A good standby; the ninety stalked variety recommended in preference to he Cuban and so-called Indian varieties. |
| Cowpea | Grain or hay | Sep. to Jan. | Oct. to Jan. | Oct. to Jan. | 3 0 | 0 8 | 10 lb. | 15 to 20 | 4 to 4½ | Somewhat difficult to conserve as hay; is valuable as silage crop in conjunction with sorghums and fed to cows, cut when pods have formed, after wilting for twenty-four hours. |
| Elephant Grass | .. | Aug. to Oct. | .. | .. | .. | .. | .. | .. | 4 to 5 | Matured growths are unpalatable to stock but abundant forage is provided by young growths. |
| Field Peas | Fodder | Mar. to June | Mar. to June | Apr. to June | 2 0 | .. | ½ to ¾ | 1 to 1½ | 4 to 5 | Recommended for use in conjunction with winter cereals. |
| *Giant and other Couch Grasses.* | Pasture | Aug. to Oct. | Aug. to Oct. | .. | .. | .. | .. | .. | .. | Suitable for semi-tropical and tropical conditions. |
| Kikuyu | Pasture | Sep. to Jan. | Sep. to Jan. | Sep. to Jan. | 4 0 | 4 0 | 2,722 roots per acre | .. | .. | Will not stand frost; owing to its lack of seed production it must be propagated by roots. |
| Lucerne | Hay and green feed | Apr. to May | Apr. to May | .. | Drilled | .. | 12 to 14 lb. | 16 to 20 lb. | 1½ to 2 | One of the best forms of fodder: is rich in protein and particularly useful as a hay, and practically forms a balanced ration in itself. |
| Maize | Fodder and grain | Aug. to Jan. | Sep. to Jan. | Sep. to Jan. | 4 0 | 1 3 | 8 to 10 lb. | .. | 4 to 5 | A popular fodder useful as a forage crop and one of the best for grain purposes and silage. |
| Millets, Foxtails | Hay and fodder | Sep. to Jan. | Oct. to Jan. | Sep. to Jan. | Drilled | .. | 10 to 14 lb. | 14 to 16 lb. | 2 | A quick growing fodder and hay crop: suitable for grazing off, also for silage. |
| Millets, French | Fodder and grain | Sep. to Jan. | Sep. to Jan. | Sep. to Jan. | .. | .. | 7 to 8 lb. | 10 to 12 lb. | 1½ to 2 | A useful "grazing off" crop and more suited for this purpose than for hay. |

## APPENDIX B—*continued.*

DAIRY FODDER CROPS RECOMMENDED FOR USE IN QUEENSLAND.—*continued.*

| Crop. | Purpose for which Sown. | When to Sow or Plant. | | | Distance of Rows Apart. | Distance between Plants. | Quantity Seed per Acre if Drilled. | Quantity Seed per Acre if Broadcasted. | Approximate Period of Growth. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Coastal Districts. | Tableland Districts. | Inland Districts. | | | | | | |
| | | | | | Ft. In. | Ft. In. | | | Months. | |
| Oats .. | Hay and green fodder | Apr. to June | Apr. to June | April to June | .. | .. | 1½ bus. .. | 1½ to 2 bus. | 3 to 5 | In conjunction with field peas or tares forms one of the most useful winter fodders; suitable for soiling or grazing off, and one of the best winter cereals for hay purposes. |
| Panicum .. | Hay and green fodder | Aug. to Feb. | Sep. to Feb. | Sep. to Feb. | .. | .. | 10 to 14 lb. | .. | 2 | Suitable for hay or grazing off purposes. |
| Paspalum .. | Pasture .. | Sep. to Jan. | Sep. to Jan. | .. | .. | .. | .. | .. | 3 to 4 | Where regular rainfall is assured and the grass not allowed to run to seed, forms a useful grass and is recommended for coastal dairying areas. |
| Prairie .. | Pasture and hay | Apr. to May | Apr. to May | Apr. to May | .. | .. | .. | .. | 3 to 4 | A valuable winter grass, highly nutritious and makes a fine class of hay, but requires autumn and winter rains for its development. |
| Pumpkin .. | Fodder .. | Aug. to Jan. | Sep. to Jan. | Sep. to Jan. | 8 to 10 | 3 0 | 2 lb. .. | .. | 5 to 6 | A valuable fodder crop for dairy cattle and can be stored for a reasonable period. |
| Rhodes .. | Pasture and hay | Sep. to Jan. | Sep. to Jan. | Sep. to Jan. | .. | .. | .. | .. | 2 to 3 | A rapid grower and once established useful as a dairying grass for scrub and other lands in semi-tropical belt; a good hay grass. |
| Rye .. | Fodder .. | Mar. to June | Apr. to June | Apr. to June | Drilled | .. | ¾ to 1 bus. | .. | 3 to 5 | An early winter cereal useful in conjunction with winter legumes; thrives on poorer classes of soil in temperate districts. |
| Sorghum, Grain | Fodder and grain | Aug. to Feb. | Sep. to Jan. | Sep. to Jan. | 3 6 | 0 8 | 3 to 4 .. | .. | 3½ to 5 | For silage or grain purposes. More dependable as a summer growing grain crop than maize in dry districts. |
| Sorghum, Succh. | Fodder .. | Aug. to Feb. | Sept. to Feb. | Sept. to Jan. | 3 6 | 0 8 | 4 to 5 lb. .. | .. | 3½ to 5 | For silage purposes or green fodder; may also be conserved in the form of stover |
| Soy Beans .. | Grain and fodder | Sep. to Jan. | Oct. to Jan. | .. | 2 6 | 0 8 | 8 to 10 .. | .. | 3 | Capable of making a good class of hay, or in conjunction with sorghum forms a useful silage crop. |
| Sudan Grass .. | Hay and fodder | Sep. to Feb. | Sep. to Jan. | Sep. to Dec. | 2 6 | .. | 3 to 4 .. | 8 to 10 lb. | 2 | A useful form of sorghum largely used in the Darling Downs for grazing off. |
| Tares (Vetches) | Fodder .. | Mar. to June | Mar. to June | Apr. to June | 3 0 | .. | ½ to ¾ .. | 1 to 1½ .. | 4 to 6 | A late maturing legume and when combined with wheat constitutes practically a balanced ration. |
| Wheat .. | Grain and hay fodder | Apr. to May | Apr. to July | Apr. to June | Drilled | .. | ¾ .. | 1 bus. .. | 3 to 5 | A good winter fodder alone or in conjunction with field peas and vetches; makes excellent hay. |

Plate 33.

Illawarra Milking Shorthorn Bull, a consistent prize winner at the Royal National and other Queensland shows. One of the finest specimens of the breed we have at present in the State. The chief considerations in selecting a sire to head a dairy herd are type, conformation, and milk and fat production records of progenitors.

Plate 34.

Illawarra Milking Shorthorn Cow representative of the breed in this State. A Reserve Champion and consistent prize winner for her owner, a Queensland breeder.

## APPENDIX C.

DAIRY STATISTICS.

Years 1922, 1923, 1924, and 1925.

| | | 1922. | | 1923. | |
|---|---|---|---|---|---|
| | | Commonwealth. | Queensland. | Commonwealth. | Queensland. |
| Number of dairy cows | .. | 2,381,480 | 558,945 | 2,362,227 | 538,106 |
| Milk production .. | gall. | 685,310,000 | 134,032,000 | 672,532,000 | 104,204,000 |
| Average production .. | gall. | 288 | 240 | 285 | 194 |
| Milk used—Butter-making .. .. | gall. | 524,759,122 | 110,626,662 | 504,582,351 | 83,903,988 |
| Milk used—Cheese-making .. .. | gall. | 23,087,651 | 9,774,783 | 25,389,566 | 7,244,735 |
| Milk used—Condensing concentrating .. | gall. | 14,301,099 | 2,700,788 | 16,888,972 | 2,181,379 |
| Milk used—Other purposes .. .. | gall. | 123,161,710 | 10,929,597 | 125,670,634 | 10,873,775 |

| | | 1924. | | 1925. | |
|---|---|---|---|---|---|
| | | Commonwealth. | Queensland. | Commonwealth. | Queensland. |
| Number of dairy cows | .. | 2,374,641 | 548,707 | Unavailable | 611,426 |
| Milk production .. | gall. | 862,394,000 | 170,074,000 | „ | 165,656,388 |
| Average production | gall. | 363 | 310 | „ | 271 |
| Milk used—Butter-making .. .. | gall. | 677,316,371 | 143,088,224 | „ | 137,673,615 |
| Milk used—Cheese-making .. .. | gall. | 32,328,872 | 12,462,873 | „ | 13,499,044 |
| Milk used—Condensing concentrating .. | gall. | 17,629,426 | 2,657,981 | „ | 2,437,100 |
| Milk used—Other purposes .. .. | gall. | 135,119,046 | 11,864,622 | „ | 12,046,629 |

Average Milk per Cow in Various States for the years 1921, 1922, 1923, and 1924 at 4 per cent. Fat.

| | 1921. | | 1922. | | 1923. | | 1924. | |
|---|---|---|---|---|---|---|---|---|
| | Gals. | Butter Fat. | Gals. | Butter Fat. | Gals. | Butter Fat. | Gals. | Butter Fat. |
| New South Wales | 363 | 145·2 | 281 | 112·4 | 285 | 114 | 391 | 156·4 |
| Victoria .. | 366 | 146·4 | 329 | 131·6 | 340 | 136 | 393 | 157·2 |
| Queensland .. | 301 | 120·4 | 240 | 96 | 194 | 77·6 | 310 | 124·0 |
| South Australia .. | 333 | 133·2 | 316 | 126·4 | 350 | 140· | 336 | 134·4 |
| Western Australia | 223 | 89·2 | 213 | 85·2 | 217 | 86·8 | 218 | 87·2 |

## APPENDIX D.

## THE DEPARTMENTAL HERD-TESTING SCHEME.

Customarily it is expected that approximately 200 dairy cows will be submitted simultaneously to the test in a locality visited by the herd-testing officer.

No fee is charged to cover the cost of testing, but it is expected

PLATE 35.

A typical Friesian Cow in a well known Queensland herd—a Champion prize winner in the show ring.

that those submitting their herds to a test will arrange for the conveyance of the testing appliances from the nearest railway station to the centre where it is intended the testing shall be carried out; and in instances where there is available no hotel or boarding-house accommodation for the herd-testing officer, it is expected that those submitting their herds to a test will arrange board and lodging (not free) for that officer during such time as he is actually engaged in the testing of the herds. Following are detailed particulars of the Departmental scheme:—

The object of dairy herd testing is to raise the standard of the milch cows in the dairying districts of Queensland, and to give the dairymen such instruction in milk-testing as shall enable them to test and record the milk yields of their cows and to estimate the amount of butter-fat produced by each dairy cow.

The supervision of the scheme and the testing of the herds are controlled by the Department of Agriculture and Stock, and the actual testing of the milk yields of the cows submitted to the test is carried out by an officer of that Department. The method adopted is to carry out four periodical tests at intervals of approximately sixty days throughout the season.

A record of butter-fat produced by each animal tested is computed from these test results, and a copy is forwarded to the owner at the end of the lactation.

No fee is charged for such services, but in order to ensure continuity of the tests dairy farmers are asked to sign an agreement form, that they are willing to submit their herds for testing at least four times during a season.

Application for the services of a herd-testing officer should be made through the Local Producers' Association to the Under Secretary, Department of Agriculture and Stock, Brisbane.

It is essential that dairy farmers in each locality should submit their herds simultaneously, and that whenever possible at least two hundred cows be brought forward for testing in each centre.

It is the wish of the Department that the full benefits of the officers' services may be available to both the dairymen and the State, and that all milch cows proven unremunerative as butter-fat producers will be withdrawn from the herds and replaced by more suitable and profitable animals.

It is not expected that any faulty or unprofitable cows, discovered through the efforts of our officers, will be disposed of by an unscrupulous dairyman to his neighbour.

PLATE 36.

An Ayrshire Cow in a noted Queensland herd, representing the type that fills the eye of the breeder who combines bucket value with show ring fancy.

PLATE 37.

A Champion Jersey Cow, in her day a great prize winner in every Jersey class. Representative of type of milk producer aimed at by Queensland breeders.

### Directions for taking Samples for Testing.

In taking the sample of milk the greatest care must be exercised to procure a representative sample, as upon this practically depends the value of the testing.

As soon as the milk is drawn from the cow it should be weighed. A small spring balance is the most suitable for this. Immediately after weighing, pour the milk from one bucket to another several times, and without delay take a small quantity of the milk with the ladle supplied and pour the milk into the sample bottle. The larger-sized ladle is to be used for taking the morning sample, and the smaller-sized ladle for measuring the evening sample.

The bottles supplied contain a preservative, and they must be kept securely corked after each sample is taken. Do not wash out the bottle before putting the milk in.

On the chart supplied write the name of each cow plainly in the column set out for that purpose; also, the corresponding number appearing on the chart must be written on the frosted surface of sample bottle. Then, as the cows are milked, record the weight of the milk yield opposite the name of each animal on the chart, and take the sample as above directed.

When the samples of milk have been taken for a period of four days with hand-milked herds and forty-eight hours where milking machines are used, they should be forwarded to the officer in charge of the testing in your district, who will give any further information you may require.

In no case will testing be done of samples taken for one day only.

Dairymen are advised that the test results are not sufficiently reliable for the purpose of culling a herd unless composite samples are taken and tested at intervals of about two months during lactation period. The requisite sample bottles will be periodically supplied by this office.

In order that correct records may be computed it is important that owners supply the date of calving of cows submitted.

As far as possible, the testing officer will instruct dairy farmers at each centre in the practice of testing milk by the Babcock method.

In every instance the full complement of cows in profit in the herds must be entered for testing by dairymen.

It is not intended that the testing officer will provide test results relative only to a few selected animals from each herd.

Where no hotels are available, it is expected that arrangements will be made for accommodation of the testing officer.

The Department pays the freight on the railway, but where it is necessary to carry the plant by other conveyance it is expected that farmers will defray the expenses.

Other Bulletins will be issued at intervals.

# PHOSPHORUS DEFICIENCY IN STOCK.

Lecture by Sir ARNOLD THEILER, K.C.M.G., D.Sc., Dr. Med. Vet.

*Phosphorus deficiency is unquestionably a limiting factor in the growth rate of cattle, and a dominating factor in the maintenance of live-weight under ordinary grazing conditions. The foregoing points formed the text of a most important public lecture delivered by Sir Arnold Theiler, a world-renowned veterinary scientist, and a visitor to Australia under Commonwealth auspices, at the Queensland University, on 16th July. The lecture created a profound impression, and although the feeding of bone-meal to stock has been practised by some farmers in the coastal belt in Queensland for upwards of twenty years, the information given by the eminent lecturer is greatly appreciated. The subjoined report will be read with interest by Queensland stock raisers.*

IN this Journal for March, 1925, we reprinted a very able article—"Phosphorus in the Live Stock Industry"—from the "Journal of the Department of Agriculture," of the Union of South Africa,* by Sir Arnold Theiler, Dr. H. H. Green, and Dr. P. J. du Toit. That article created a widespread interest among stock owners in Queensland, who also recognise the valuable work done here by Mr. J. C. Brünnich, of the Department of Agriculture and Stock, on somewhat similar lines.

It was as the outcome of the Imperial Conference of the Council of Scientific and Industrial Research, held last year, that Sir Arnold Theiler was invited to visit Australia to exchange ideas and to discuss matters of mutual interest with the men engaged in veterinary research in this country. He is recognised as a world's authority on matters concerning the health of stock, and though born in Switzerland, has spent most of his life in South Africa. He retired last year from the position of Director of the Veterinary Institute of South Africa, at Pretoria, a post he had held since 1906. This institute is the largest of its kind in the world, and is devoted to the training of men in scientific veterinary research.

The lecture was given under the aegis of the Royal Society, and the Vice-President (Professor E. J. Goddard) presided.

Sir Arnold, in his opening remarks, said that he had come to Australia with an open mind to interest himself in Australia's problems in so far as animal health conditions were concerned. Such problems in South Africa appeared to have much in common with those in Australia, although Australia did not possess certain pests found only in an older country.

## A Mysterious Malady.

Delving straight away into his subject, Sir Arnold said that for many years a disease had existed in South Africa, causing paralysis and death of cattle, and its cause was a mystery. Many stock owners in Australia would remember that the same disease was very much in evidence in this country some twenty-six years ago. Fortunately the occurrence of this disease was now comparatively rare, as most stock owners now used licks containing bone-meal, or other mineral foods containing phosphates for their stock.

Sir Arnold then proceeded to outline the thorough investigations which were made to determine the nature of the disease, which, for want of a better name, was variously described as "land sickness," because it was generally believed that the land had become unhealthy through continuous grazing, or paralysis, on account of paralysis of the body—particularly the hind portions—which, in the later stage of the disease, prevented the animal from getting on to its feet. The first investigation made was to determine whether ticks or toxic plants were responsible for the disease, and at the same time a careful study was made of the animals in the field. It was noticed that thriftless animals indulged in the habit of chewing sticks and bones. This provided the clue. An examination was made of fragments of bone picked up on the veldt. Some of these bones were desiccated, and cultures were prepared, from which toxic bacteria were isolated. When a drench containing a quantity of these crushed bones was administered to cattle, the paralysis disease was produced. The cultures prepared from the bacteria found in the bones was so toxic that an injection of one

* "Jour. Dept. Agr." South Af., No. 5, Vol. VIII., 1924.

ten-thousandth part of a cubic centimetre would produce illness, followed by paralysis. This culture was found to be toxic for all domestic animals. The credit for isolating this bacterium belonged to Dr. Seddon, of New South Wales, and subsequently a bacterium was isolated in South Africa, which Sir Arnold regarded as identical with that discovered by Dr. Seddon.

### The Bone-chewing Habit.

But the unnatural habit displayed by cattle, which caused them to chew bones, and even to eat the flesh of other animals, suggested to Sir Arnold a craving for some mineral substance which was deficient in the food. It was found that the diseased animal was affected by weakness of the skeleton, and experiments were instituted to determine whether this osteophagia—or bone-eating craze—was due to a deficiency of calcium or phosphorus. Phosphorus was supplied in various forms—organically by means of wheat-bran, and directly, in the form of sterilised bone-meal, sodium phosphate, and phosphoric acid. In each case in which phosphorus was supplied the disease was checked, but recurred when the phosphorus was discontinued. The control animals, on the other hand, which were fed with chalk, showed no improvement, but, on the contrary, osteophagia became more acute. It was also found that the disease disappeared when animals were grazed upon pastures dressed with phosphatic fertilisers.

### Experiments in the Field.

Continuing, Sir Arnold said that in order to determine the composition of the natural food, analyses were made of the pastures each month throughout the year. These disclosed the fact that the young grass contained a higher percentage of phosphates, and the phosphate content reached its peak in the spring, with a percentage of .6, but receded to .09 per cent. at the end of summer. Similarly, osteophagia was checked when the animals were grazing upon young grass, but was found in its most acute forms when the phosphate content of the grass was low. The estimated energy value of the grass was highest when it was young, and the lime content increased during the year as the estimated energy value decreased. In this way it was deduced that the craving for minerals was produced by synthetic feeding upon a ration consisting of chaff, and the endosperm of maize, which is deficient in phosphates. In every case the disease was checked when 3 oz. of bone-meal was added to the daily ration. Diseased cattle were then lined up in a crush and given daily doses of 3 oz. of bone-meal. They quickly learned that the drench—it was given in that form—was beneficial, and patiently but expectantly awaited their turn for treatment. The sleek, healthy appearance of these cattle contrasted strongly with the miserable and emaciated condition of the controls which received no bone-meal.

### Remarkable Demonstrations.

Sir Arnold proceeded to describe the wonderful results achieved. Fifty head of cattle, all about the same age and weight, were selected for an experiment, which commenced in June, and lasted for twelve months. Those which received a daily allowance of 3 oz. of bone-meal steadily increased in weight, being 67 lb. heavier than the controls (average) in February, and 105 lb. heavier in May. The controls put on weight in the spring, while the phosphatic content of the pasture was at its peak, but developed osteophagia as the summer advanced. At the end of the year they were about the same weight as at the beginning of the experiment, whilst the others retained practically the whole of the weight gained. The experiment was repeated with younger animals, which averaged about 650 lb. At the end of the year the animals receiving a daily allowance of bone-meal reached an average weight of 900 lb., while that of the controls was 750 lb. Although due allowance must be made for the larger frames of the heavier animals, the greater proportion of the increased weight consisted of meat. Experiments conducted to determine the mineral requirement of different animals indicated that mature animals require less than growing youngsters; cows in calf require up to 24 oz. of bone-meal per week; but a cow which loses her calf requires less. Analysis of milk shows that there is no increase in the phosphoric acid content of the milk, but there is an increase in quantity of milk up to 40 per cent. Where the food is deficient in phosphate, the quality of the milk is maintained by leaching out phosphates from the skeleton, the animal suffering, of course, as a consequence of this drain upon the skeletal structure.

### How Bone-meal Affects Growth.

Another experiment which provided valuable information was designed to test the influence of phosphorus on growth. The animals selected were fed a ration of flaked maize, which has a low phosphorus content, with an ad libitum supply of hay of low phosphorus content. Half the animals were given a daily ration of bone-

meal from July to October, when the experiment was reversed, and again reversed in February. The crossing of the lines of the graph when the conditions were reversed indicated a rapid response to the added phosphate. While receiving phosphates, the animals consumed a larger quantity of hay, but turned it to good account, for they made rapid gains in weight. It would appear, therefore, that phosphorus played an important part in metabolism, acting in this regard similarly to a vitamin.

**Rickets in Stock.**

The lecturer then passed on to a consideration of rickets, which is prevalent among stock in South Africa, where both calcium and phosphorus are deficient. Rickets is indicated by the animals becoming lame, exhibiting an excessive growth of hoof, and a thickening of the joints. The addition of lime alone failed to cure this condition. The disease could be artificially produced when the animals were given food deficient in both lime and phosphorus. The thickening of the bone resulted as an effort on the part of nature to fortify the weakened bone by depositing isolated masses of cartilage and connective tissue—but it failed to calcify. This disease in cattle was also cured by the use of phosphorus. It is known that in children—and experimentally in dogs and cats—that rickets has been caused by an absence of vitamin "A," but vitamins do not come into action in cattle feeding excepting in the case of manufactured foods such as oil cake, &c. Therefore, in cattle, rickets and osteoporosis may be caused by a lack of phosphorus, and cured when this deficiency is made good. Osteoporosis is a deficiency disease which occurs in bones more or less fully developed, and consists of decalcification.

He showed that phosphorus deficiency could be detected by an analysis of the blood, and said that this method of diagnosis was now commonly used in South Africa.

**Summary of Conclusions.**

In summarising the benefits to be derived from the use of phosphates, the lecturer pointed out that the mortality of cattle on the veldt, where phosphorus was supplied was 6.33 per cent. compared with 49.45 per cent. in the case of controls. Also, the fertility was 90.28 per cent. in the case of the fully nourished cattle as against 36.49 per cent. in the controls. In horses, phosphorus deficiency produced a remarkable form of osteoporosis, known in Australia as "big head," the tissues of the bone and cavities of the skull being filled up with new growth.

The lecture was admirably illustrated by a long series of lantern slides, clearly depicting the wonderful results obtained by feeding with bone-meal; and also by graphs of a most striking character.

At the conclusion, Mr. J. C. Brünnich, F.I.C. (Government Agricultural Chemist) said that, although the feeding of bone-meal to stock had been practised in Queensland for nearly twenty years, there had never been such a clear demonstration of its value. If farmers and pastoralists could read this lecture he had no doubt that it would play an important part in increasing the efficiency of production in Queensland. He was convinced that by such systems of proper scientific feeding the carrying capacity of land in this State could be increased by at least 50 per cent. The lecture was specially important because the conditions in South Africa closely approximated those in this State.

Mr. A. J. B. McMaster (president of the Pastoralists' Association of Queensland), in seconding the vote of thanks, said that the carrying capacity of the Western pastures was much less to-day than it had been thirty or forty years ago, although millions of pounds had been spent in effecting improvements. There was no doubt that there was some deficiency in those pastures, and, perhaps some method such as Sir Arnold had described could be found to supply what was missing. It was due to the Federal Government that they were receiving visits from such distinguished men as Sir Arnold Theiler, whose expert knowledge would be of inestimable value to the primary industries upon which Queensland so largely depended.

**Australian Research.**

Research into the relation between phosphorus and the health of animals has not been neglected in Australia. Professor Brailsford Robertson, of the Adelaide University, having conducted investigations for the last five years, while in Queensland, Mr. Brünnich and Major A. H. Cory, M.R.C.V.S. (Chief Inspector of Stock) have been especially interested in the subject. Future research at the University is designed to embrace an examination of soils from different districts with a view to discovering whether they carry phosphoric acid and lime in the proportions requisite to form bone. To aid in this work the composition of bones from sheep from various districts will be studied, and the suitability or otherwise of the soils gauged from that.

# ACHIEVEMENTS IN AGRICULTURE.

## SCIENCE AND MODERN FARMING.

Lectures by Sir JOHN RUSSELL, O.B.E., D.Sc., F.R.S., Director of the Rothamsted Experimental Station, Harpenden, England.

*"In 1898 Sir William Crookes predicted that the world in 1931 would require 90,000,000 tons of wheat to feed its population, and that this represented the utmost the world could produce. After that the world would be faced with starvation. The advance of science in agriculture has upset that calculation. Sir William Crookes' limit was exceeded in 1911, and could be enormously increased to-day. The fear of world starvation has fled before the advance of science. The problem before the world now is to ensure that the farmer shall get his fair share of the profit so as to encourage him to use all the knowledge that science can teach."—Sir John Russell.*

IT has been customary of recent years for the Australian Universities to unite in extending an invitation to some distinguished scholar to visit Australia, and deliver lectures upon his special subject. The visitor for 1928 is Sir John Russell, O.B.E., D.Sc., F.R.S., at present Director of the Rothamsted Experimental Station, Harpenden, England. To his fine academic record, Sir John Russell has added an extensive practical experience, and his published works, on subjects of agricultural interest, have earned for him a world-wide reputation. Born at Frampton-on Severn in 1872, Sir John Russell was educated at the University College of Wales, Aberystwyth, and Victoria University, Manchester. He held various academic posts before he was associated with the Rothamsted Experimental Station; he was Technical Adviser to the Food Production Department, a Member of the Munitions Inventions Panel, and a Member of the National Salvage Council during the war period.

His publications include the following:—

The Fertility of the Soil;
Soil Conditions and Plant Growth;
Manuring for Higher Crop Production;
Farm Soil and its Improvement; and
Plant Nutrition and Crop Production.

Some the most remarkable developments of modern times are incorporated in the achievements of science in the agricultural field, and when these were presented by such an eminent scientist as Sir John Russell in the form of a public lecture, the first of a course of two, in Brisbane on 19th July, the subject proved to be of absorbing interest.

The Vice-Chancellor of the University, Dr. W. N. Robertson, presided, and the large audience included Sir Arnold Theiler, members of the Senate and Faculties of the Queensland University, Mr. E. Graham (Under Secretary), Mr. Robt. Wilson (Assistant Under Secretary), and a large number of officers of the Department of Agriculture and Stock.

### Science and Modern Farming.

Sir John Russell dealt with the subject of "Science and Modern Farming," and his lecture was illustrated with an excellent series of lantern slides. He prefaced his address by paying a tribute to Sir Arnold Theiler, who, he said, had dealt convincingly with the application of science to the animal husbandry side of farming. He said that in regard to agriculture the first problem the scientist had to face was to discover the food upon which plants lived, and this was solved in the 19th century by the botanists and physiologists in Geneva. That knowledge was steadily improved. When the facts were known, chemists and agriculturists were able to apply that knowledge to the feeding of crops, and thus in 1840 Lawes of Rothamsted and Liebig of Germany discovered artificial fertilisers.

### Artificial Fertilisers.

Sir John divided the chief fertilisers in use into four classes—nitrogenous, phosphatic, potassic, and organic. The second great triumph was achieved, he said, when it was found possible to obtain this nitrogenous fertiliser from the air.

"Modern farming," he said, "may be said to have begun forty years ago, when the development of transport enabled farm products to be sent all over the world, and so broke the monopoly which the home farmers had previously enjoyed. It caused a revolution in farming, and science aimed at helping the farmer by enabling him to increase the production per acre, and in reducing costs by eliminating wastes and losses." The introduction of artificial fertilisers came in very opportunely, notably superphosphate, sulphate of ammonia, nitrate of soda, and potassic salts. These had added greatly to the productiveness of the soil, all over the world, giving larger crops of cereals, potatoes, sugar beets, and other products, and they were also being largely used in England and Europe, adding greatly to the carrying capacity of pastures, and increasing the production of milk and meat. The importance of superphosphates in developing agriculture in Australia was now well known. It had been established that fertilisers not only increased the crop; but altered its constitution and habits of growth. This was being used to influence quality, and especially to help the plant to adapt itself to different weather conditions. For instance, superphosphates encouraged root development, and, therefore, helped the young plant to become established, and to send its roots down into the moist subsoil—a very valuable quality in dry seasons. Sulphate and muriate of potash increased the efficiency of the leaf, and so helped the plant in a sunless season. This explained their importance in Northern Europe. In regions where the climate was fairly regular from season to season, this method of adjusting the crop to the climate by means of fertilisers was likely to be very useful when it was better understood. In the uncertain climate of England it had already proved useful in levelling good and bad seasons, especially for the growth of fodder crops.

### Costly Plant Diseases.

Another direction in which science is helping agriculture, said Sir John, "is in the production of new varieties of crops, better adapted to the conditions of the farm, or more resistant to disease than the old ones." These new varieties, he said, were being produced all over the world. In recent years there had been increases in the number of plant diseases, and in these times of efficient transport diseases were liable to be carried from one country to another. The most destructive disease in the history of mankind had been the ordinary potato blight (Irish blight). This was a native of South America, and about 1840 it swept Ireland with all the vigour of a new pest, destroying the potato crop upon which the peasants lived, with the result that thousands died in the terrible famine that followed. For forty years Ireland was never free from this disease. Of all the tyrants Ireland had, the potato blight was the worst. After forty years, science discovered a remedy—and it was found by accident. A vigneron in France discovered that boys were stealing his grapes, so he prepared a mixture which would have the effect of killing the blight with which the vines were affected, and also deter the boys from eating his grapes. He found that it effectually killed the mildew, so he tried it on potatoes that were blight-stricken, and it killed that disease also. It was thus that what is now known as Bordeaux mixture was discovered, and since then potato blight has been effectually controlled.

### Cultivation of Waste Spaces.

Another disease which was very troublesome was the wart disease in potatoes. Happily, after much research, an immune variety was discovered from which a number of other varieties had been raised. The result was that this disease, which would probably have proved a catastrophe, had merely been a nuisance.

"Perhaps the greatest triumph of science," said Sir John, "had been to bring into cultivation the waste spaces of the earth. First, the trouble had to be diagnosed. Sometimes it was lack of plain food; sometimes lack of water; sometimes too much acidity, alkalinity, or too much salt. Soil chemistry was now so well advanced that the trouble could be located without much difficulty." He instanced cases in which vast tracts in Egypt and California, had been rescued by science from devastation in this way.

### Irrigation Problems.

"Every irrigation area," he proceeded, "is likely to present problems as to the suitability of the soil or some other condition. It is, therefore, extremely desirable that there should be constant control by agricultural chemists so as to ensure that the sudden appearance of any salt or alkali trouble can be discovered in time to permit of steps being taken to effectually counteract it."

On the motion of Mr. Graham, seconded by Professor Goddard, a hearty vote of thanks was acorded to the lecturer.

# SOIL FERTILITY.

## SIX ESSENTIALS.

SOME of the essentials of a fertile soil were outlined in Sir John Russell's second public lecture on Tuesday, 24th July. These included a sufficient supply of air, water, nutriments, a suitable temperature, depth for the plants to develop their roots, and the absence of injurious factors. The importance of irrigation and of green and farmyard manure in conserving and providing the necessary water supply was touched upon, and it was emphasised that all clays, which played an important part in determining the fertility of the soil, benefited by the addition of limestone.

The Minister for Agriculture and Stock (Mr. W. Forgan Smith), in introducing the lecturer, observed that there was no doubt as to the need for improving methods of cultivation in Australia, with a view to increasing the yield from the land, and by that means making conditions of living on the land more attractive to the people, and thus increasing the sum total of wealth produced in the State and Commonwealth.

### Not a Problem for Chemists Only.

Sir John Russell said that by a fertile soil was meant a soil which would grow the plants they wanted it to grow. In order that this might be accomplished, it was necessary that they should give the plants the conditions that they required for crop growth. Not so long ago it was thought that soil fertility was simply a matter of plant food, and that the science of agriculture was simply a branch of chemistry. It was thought the chemist would be able to analyse the soil, and ascertain exactly what foods were lacking, and that then the farmer would be able to add those foods, and make an unfertile soil a fertile one. Chemists certainly had secured very great triumphs. They had succeeded in making a number of substances which were valuable plant foods, and had greatly increased the fertility of the soils. The discovery of superphosphates was an illustration. It was found that when superphosphates were added to the soil, it greatly increased in productiveness. It was now known, however, that it was only possible for the chemist to ascertain the deficiencies of the soil to a very limited extent, and it was much safer to make an actual trial of the soil and the various fertilisers to see which of the plant foods was deficient. A piece of ground was divided up into a number of plots. One of these plots would receive no fertilisers, others would receive nitrogenous, phosphatic or organic fertilisers, and the crops would be compared.

### Plant Feeding—Certain Substances Essential.

There was an aspect of the feeding of plants which had only recently come into prominence, and that was recognition that plants required certain substances, certainly only in minute quantities, absolutely. If they had not got them, then they would not grow. It had been proved by experiments with broad beans that a soil containing all the recognised elements of plant foods was not sufficient. However, when borum was added in the form of borax they grew steadily, and became normal in every way. It was known that other elements were needed in this way only in very minute amounts. Certain soils appeared to be deficient in the necessary small quantity of manganese, and in those soils the plants produced certain disease symptoms. There were, in fact, diseases in plants which resembled deficiency diseases of animals and human beings. They were caused through the lack of some small quantity of an element which was vital to the growth of the plant and without which they could not develop properly. These elements were only slowly being discovered because it was a difficult operation to find them out. Already they knew of borum, manganese, and iron, and just a few others.

### Six Factors in Fertility.

Experiments at Rothamsted had shown that the contention that the food of the plant was the controlling factor in soil fertility was not correct. It had been found that wheat would grow quite normal on a piece of land which had no manure for ninety years, whereas on land on which weeds were allowed to grow unchecked the plant was reduced in size, and quite abnormal. It had been show, therefore, that weeds would, in a short time, do what ninety years of starvation had failed to do. Naturally, then, these experiments brought into prominence the fact that there were other things in soil fertility besides the provision of plant foods. Detailed studies in the laboratory had shown that six factors at least, were necessary in order that there should be a fertile soil. Firstly, there must be a sufficient supply of air to the roots, because plant roots breathed just like men and animals, and were easily suffocated and readily injured. Unless there was an adequate supply

of air in the soil plants could not grow. Then they obviously required water and nutriments, or foodstuffs. There, too, must be a suitable temperature and sufficient root space. This meant that the soil must be sufficiently deep for the plants to develop their roots properly. Some plants wanted a deep soil, but others could tolerate a more shallow soil. Then there must be an absence of injurious factors. Fifty years ago nutriments were the only things which were regarded as essential, but now a fertile soil must satisfy the other five conditions as well.

### Importance of Suitable Soil Depth.

Of all those, perhaps the most important was a suitable depth. If a soil was too shallow, plants could not grow well, no matter what was done. Shallowness of soil might be due to a layer of rock under the soil, or to a water table. It happened not infrequently in valleys and low-lying land, where the water table was near to the surface, that directly the roots touched the water they ceased to grow. Some plants were very intolerant of free water. Lucerne, for instance, would not tolerate free water, and failed to grow if the water table was too near the surface. A highly important factor with regard to the plant was the supply of water. That was determined, in the first instance, by the rainfall, but it was profoundly affected by the nature of the soil. When soil was examined closely under a microscope, it would be found that it was entirely distinct from grains of sand or mineral matter in that it possessed certain sticky qualities. Soil consisted of hard mineral particles, the sand or grit, colloidal materials, water, and air. If the soil contained a large amount of colloidal materials, then the spaces got filled up, and there was not much air present. Soil of that kind was very sticky. Sandy soil suited one kind of plant, and was not suited for all kinds of plants, in spite of its low power of holding water, and clay other plants. There were places, however, where the soil was so shallow that it was impossible to cultivate it economically. Deep sand always was well suited for fruit, particularly for citrus, and clay soils were found to be extraordinarily well suited for grass and fodder crops. An example of this occurred on the Darling Downs, where the soil tended to be sticky in places, and there it was found that lucerne would grow admirably. Under such conditions fodder crops of the grass and clover variety would grow well.

### The Value of Clay.

Recognition of the importance of clay had led to a detailed study of clay in the soil, and it now was known that clay played a great part in determining the fertility of the soil. Chemists had studied the composition of clay in the soil, and they found there were three different kinds: calcium clay, sodium clay, and acid clay. They had also found that clay was of the same constitutents as ordinary salt. Under a high rainfall there was a tendency for the soil to become acid, and the proper way to deal with acid clay was to treat it with lime. In Queensland all three forms of clay were to be found. All these clays were greatly benefited by the addition of calcium carbonate, either in the form of limestone or gypsum. This rendered the soil less sticky.

### Water Supply.

After emphasising that it was very important to examine the lower portions of the soil, because soil fertility was not confined to the surface, the lecturer went on to say that it required a greater amount of water for crops than anything else. Of course, the best way to ensure an adequate water supply was to have a natural rainfall, and the second best was to have an irrigation system. Where there was neither a sufficient rainfall nor an irrigation system, a great deal could be accomplished by proper cultivation. Proper cultivation conserved the soil moisture, and it was one of the most potent factors in soil fertility. In the State of Utah the Mormans had made a fuller study of water conservation and irrigation than any community known. Where the rainfall was about 25 inches, the addition of organic matter, either in the form of farm yard manure, or green manures, was valuable in securing an adequate supply of water. They gave to the soil power to hold the water. As a fact it was common in England to grow a crop, and then allow the sheep to eat the crop on the land. The sheep were penned in, and kept closely on to the crop, and when they were removed the land had been well manured. This method of combining sheep with arable farming had led to a great improvement in agriculture, not only in Britain but elsewhere. The sheep kept up the supply of organic matter in the soil, and it was found that the crops grown after they were removed gave high yields. Some of the most prosperous times in agriculture in England had been when they successfully combined sheep with other arable crops.

**The Use of Green Manures.**

The use of green manure also added organic matter to the soil. At present only a few crops were used for the purpose, but it was important to study a considerable range of crops to ascertain which was the best to use under different conditions. Cowpeas were largely used. Green manurs had all the effects of farm yard manures in increasing the power of the soil to hold moisture, and making it easier to work, and they had the further advantage that they supplied valuable food to the plant. Leguminous green manures, such as cowpeas, supplied nitrates, which were lacking from soils in wet regions.

Sir John Russell also explained the effect of various minute organisms, both harmful and advantageous, on the soil, and referred briefly to the efforts made in England to produce organisms which were rather more severe in their influence on the soil than those in the wild state.

## VISITS TO THE AGRICULTURAL DEPARTMENT.

While in Brisbane Sir John Russell paid several visits to the Agricultural Department, and interested himself very keenly in the work of the scientific and technical services. He was apparently impressed with the progress in research and field activities as carried out by officers of the Public Service. On 23rd July he met the whole of the scientific and technical staffs, and addressed them at length on some aspects of soil science. His remarks were followed with intense interest, and at the conclusion of his address he was accorded a cordial vote of thanks on the initiative of the Under Secretary, Mr. E. Graham, seconded by Mr. H. T. Easterby (Director of Sugar Experiment Stations).

*Photo.: Miss J. Easton, Department of Agriculture and Stock.*]

Plate 38.—Forest and Farm Land—The Charming Coochin Coochin Country, Southern Queensland.

**If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.**

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE, 1928, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING JUNE, 1928 AND 1927, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | June. | No. of Years' Records. | June, 1928. | June, 1927. | | June. | No. of Years' Records. | June, 1928. | June, 1927. |
| *North Coast.* | In. | | In. | In. | *South Coast*—continued: | In. | | In. | In. |
| Atherton ... ... | 1·58 | 26 | 0·28 | 4 10 | Nambour ... ... | 3·67 | 31 | 2·88 | 3·37 |
| Cairns ... ... | 2·86 | 45 | 0·58 | 1·84 | Nanango ... ... | 2·04 | 45 | 2·63 | 2·94 |
| Cardwell ... ... | 2·02 | 55 | 1·74 | 4·81 | Rockhampton ... | 2·17 | 40 | 1·27 | 3·97 |
| Cooktown ... ... | 2 03 | 51 | 0 35 | 1·80 | Woodford ... | 2·86 | 40 | 2·46 | 3·18 |
| Herberton ... ... | 1·00 | 40 | 0 24 | 3·45 | | | | | |
| Ingham ... ... | 2·31 | 35 | 2·14 | 4·35 | | | | | |
| Innisfail ... ... | 7·14 | 46 | 1·73 | 10·96 | *Darling Downs.* | | | | |
| Mossman ... ... | 2·10 | 14 | 0·40 | 2·65 | | | | | |
| Townsville ... .. | 1·27 | 56 | 0·48 | 4 17 | Dalby ... ... | 1·68 | 57 | 1·69 | 3·37 |
| | | | | | Emu Vale ... | 1·45 | 31 | 1·60 | 2·68 |
| | | | | | Jimbour ... ... | 1·70 | 39 | 1·89 | 3·14 |
| *Central Coast.* | | | | | Miles ... ... | 1·87 | 42 | 1·45 | 1·68 |
| | | | | | Stanthorpe ... | 1·89 | 54 | 2·60 | 2·71 |
| Ayr ... ... ... | 1·33 | 40 | 0·75 | 5·19 | Toowoomba ... | 2·42 | 55 | 2·60 | 4·12 |
| Bowen ... ... | 1·59 | 56 | 0·06 | 4·46 | Warwick ... ... | 1·77 | 62 | 1·59 | 2·83 |
| Charters Towers ... | 1·27 | 45 | 0·22 | 3·45 | | | | | |
| Mackay ... ... ... | 2·69 | 56 | 1·43 | 3·29 | | | | | |
| Proserpine ... ... | 3·46 | 24 | 1·17 | 4·29 | | | | | |
| St. Lawrence ... | 2·45 | 56 | 0·96 | 1·82 | *Maranoa.* | | | | |
| | | | | | Roma ... ... | 1·67 | 53 | 1·70 | 0·93 |
| *South Coast.* | | | | | | | | | |
| Biggenden ... .. | 2·08 | 28 | 4·73 | 2·44 | | | | | |
| Bundaberg ... ... | 2·76 | 44 | 5·25 | 3·26 | *State Farms, &c.* | | | | |
| Brisbane ... ... | 2 76 | 77 | 2·22 | 3·21 | | | | | |
| Caboolture ... ... | 2·64 | 40 | 2·56 | 2·75 | Bungeworgorai ... | 1·63 | 12 | 1·84 | 0·96 |
| Childers ... ... | 2·40 | 32 | 4·65 | 4·01 | Gatton College ... | 1·83 | 27 | 1·95 | 2 68 |
| Crohamhurst ... | 4·42 | 35 | 2·77 | 4·05 | Gindie ... ... | 1·56 | 27 | 1·19 | 0·67 |
| Esk ... ... ... | 2·16 | 40 | 2·79 | 3·57 | Hermitage ... | 1·87 | 20 | 1·46 | 2·99 |
| Gayndah ... ... | 1·85 | 56 | 2·87 | 1·82 | Kairi ... ... | 1·47 | 12 | 0·19 | 2·43 |
| Gympie ... ... | 2·64 | 57 | 3·88 | 2·91 | Sugar Experiment Station, Mackay | 2·42 | 29 | 1·11 | 3 08 |
| Kilkivan ... ... | 2·15 | 48 | 2·85 | 2·14 | | | | | |
| Maryborough ... | 2·94 | 55 | 5·74 | 3·96 | Warren ... ... | 2·29 | 12 | ... | 3·14 |

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June this year, and for the same period of 1927, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Meteorologist.

## QUEENSLAND RAIN-FOREST TREES.

BY W. D. FRANCIS Assistant Government Botanist.

The tree illustrated in the accompanying photographs is *Endiandra discolor*. It belongs to the Natural Order Lauraceæ, which has many representatives in the scrubs or rain forests of Eastern and North-Eastern Australia. This species attains a height of about 120 ft. and a stem diameter of about 3 ft. In the large trees the stem is often buttressed and the buttresses frequently somewhat resemble those of the Carribin (*Sloanea Woollsii*) in having their edges curving outwards. The species is confined to Australia and is found as far south as Gosford in New South Wales and as far as Rockingham Bay, Queensland, in the north.

*Photo.: W. D. Francis.*]

PLATE 39.—ENDIANDRA DISCOLOR. A TREE IN THE RAIN FOREST OF CEDAR CREEK TO THE WEST OF EUMUNDI.

The tree on the left of the picture is *Cryptocarya glaucescens.*


*Photo.: Dept. of Agriculture and Stock.*]

PLATE 40.—TWIG OF ENDIANDRA DISCOLOR.

# EFFICIENCY FACTORS IN DAIRY FARMING.

By L. MORIARTY, Dairy Inspector.

The most important contributing factors to success in dairying are:—

(1) The magnitude of the undertaking, which may be measured by the area of land, the amount of working capital, and available productive labour.

(2) The system of organisation.

(3) The equipment required:—Economy in operation and adequacy of equipment have a considerable bearing on profits.

(4) The adaptability of the soil, climatic and economic conditions to the enterprise.

(5) The individuality of the farmer himself.

Discussing these factors in that order we arrive at the conclusion that it is important that the magnitude of the business should not exceed the managerial ability of the owner. It is quite true that it is much easier to make money on a large farm than on a small one, but, it is also true that the larger the business the greater the possibility of loss.

The amount of working capital required depends on the size of the farm and the type of its organisation.

One type of organisation may overload the labour at certain periods of the year leaving the other periods comparatively slack; while under another system the labour is distributed evenly throughout the season. Lack of system in dairying means lost time and useless work.

The character of equipment required we will discuss later.

Too much stress cannot be laid on the adaptability of the soil, climatic and economic conditions, to the industry, and this factor should be thoroughly considered before attempting operations or going to the expense of extensive improvements. The income per animal unit is a very important factor in profit; yield per acre is also important, but less so than income per cow.

Generally the economy of the business of dairy farming is based on the butter value of milk and production per cow.

The price of dairy products throughout the Commonwealth does not vary greatly, but in different localities the cost of production varies materially. Therefore, to be a success the industry should be confined to those districts or localities where the cost of production is lowest.

As regards the individuality of the farmer, it is necessary that he should be fitted temperamentally for his particular business.

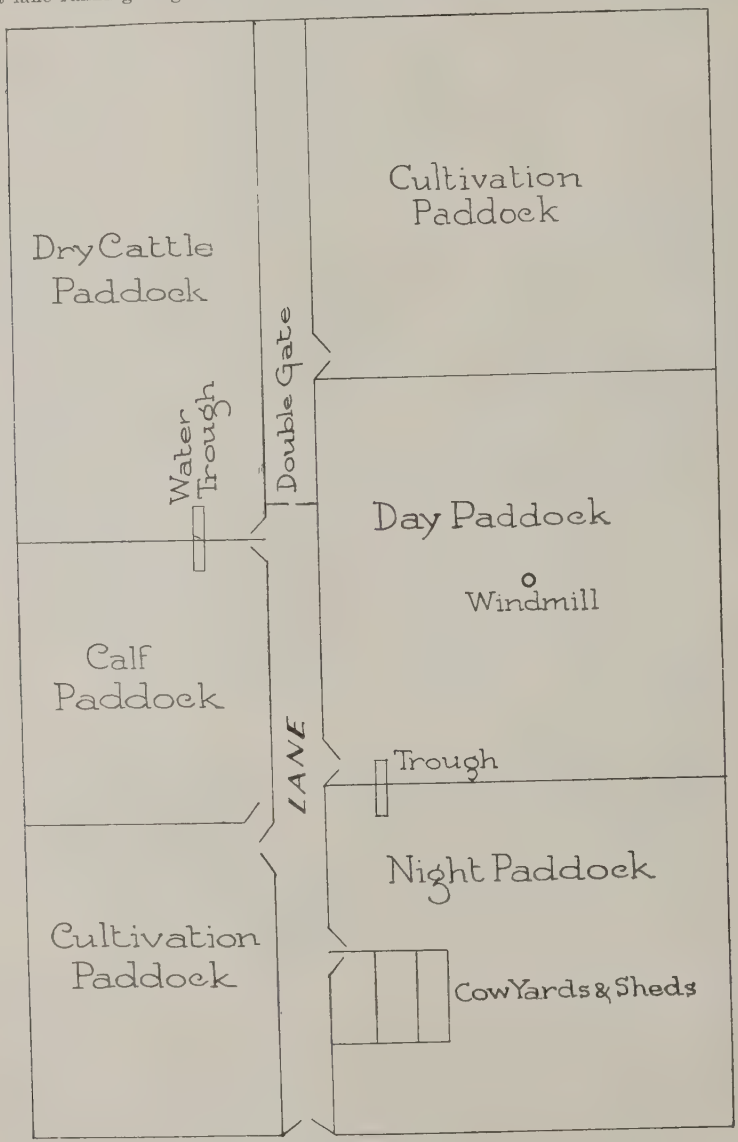
## Farm Lay-out.

The lay-out of the farm should really be the first consideration after a suitable block of land has been selected.

The new selector often dumps his camping outfit at the most convenient place for his immediate needs near water, or at the nearest point to the railway or township, and as time goes on he builds his home, yards, cowshed and dairy, and other improvements, only to find afterwards that he has double work in nearly all his operations, double cost in fencing, his cows have greater distances to travel to grass, and it is necessary to have an extra cowboy to bring them to the yard, not counting the time the animals waste when they should be feeding and producing more milk.

There are many ways according to the shape of the block or the contour of the ground in which an agricultural surveyor or farm planner could save the dairyman many pounds and much unnecessary labour (which would cut the cost of production) by surveying the block for the most easy and most economical working of the holding. This would be most opportune at the present time when so much new land is being selected in some cases by inexperienced settlers.

I have in mind a particular farm where the saving in labour and time through planning a lay-out, on the lines as shown in the accompanying sketch, is surprising. It follows that the profits are higher. This farm was cut into six paddocks with a lane running lengthwise through the block with access to all enclosures.




Rough Plan of Farm Lay-out.

It will be seen from the plan that when the cows are let out of the yard they enter a lane; and it is so arranged that there is only one gate open in the lane, and that gate leads to the particular paddock to which they are required to go. Two drinking troughs, placed at the corner of the paddocks near the lane gates, give the cows free access to water in all the grazing paddocks. When the cows are brought to the yards from the day paddock the night paddock gate in the lane is left open and the farmer is saved the time and labour of driving them. That is the idea worked in a small way, but it could obviously be enlarged upon.

**Buildings and Equipment.**

In the construction of the bails or milking shed a big saving can be made in the use of strong timber of small dimensions or iron pipe stanchions for the internal railings and bail posts. The use of heavy bush timber of large girth takes up much of the floor space in a large shed.

Then the through bails or the crush bail system should always be used instead of the antiquated type of bails which makes it necessary for the stripped cows to be turned back into the receiving yard among those waiting to be milked. Not only is the time wasted by the milkers to be considered, but the weaker cows are knocked about considerably in a crowded yard, and there is, too, the waste of time for the high-yielding cow which is always anxious to get out to feed.

Crush bails are recommended where a large number of cows are milked—they are a great time saver.

Another time and labour saving idea can be arranged for the feeding of pigs in running the separated milk by gravitation direct from the dairy to supply tanks at the pig-sties. This is more easily arranged where the dairy is situated on higher ground than the pig pens, and may be constructed with an open guttering attached to boards or battens on a fence line running from the the dairy to the pig feeding troughs. This guttering can easily be swilled out and cleansed by hot rinsing water from the dairy.

The fence panel connected with the dairy should be movable.

**A Labour-Saving Silo.**

Following are brief particulars of a comparatively cheap labour-saving silo:—

Dimensions.—12 ft. in diameter, 20 ft. high, built 8 ft. under ground, and 12 ft. above ground level.

This does away with a costly elevator, and requires less power than would be necessary in filling a 20-ft. silo all above ground.

The under ground portion, 8 ft., is excavated and lined with smooth sandstone; the crevices are filled with cement and smoothed. The over ground portion, 12 ft., is constructed of brick, but not necessarily as strong as a silo wholly constructed above ground.

The pit portion is easily filled from the cutter, while the portion above ground is filled by a light gear elevator, home made, without much exertion. Emptying the top portion is as easy as the bottom portion, with the exception of the last 2 ft. However, this is soon overcome, and the farmer is compensated for this by the low cost of erection and filling. This silo is filled more often than a higher and more cumbersome silo would be owing to the lesser trouble entailed.

**The Cow.**

The chief equipment or machinery on the dairy farm is the cow, for after all she is the machine that turns the raw material into a saleable article. In all other industries the business man considers the producing capabilities per unit of his machinery, whether it be for boots, clothing, newspapers, or ironmongery, and tries to obtain the most efficient and most economical plant, yet there are many men in the dairying industry who do not consider the efficiency of their main machinery—the cow.

It is quite possible for a dairyman—if he is serious in his business and sets a standard of efficiency—to increase the production per unit by the simple method of herd testing and culling systematically.

Many dairymen have reached the standard very quickly through having the capital to purchase a ready-made herd, but have turned out failures through the lack of knowledge in the after care and attention of their cows. The two most common faults are—

*Lack of raw material provided, irregularity in the hours of milking, and consequently irregularity in the hours of feeding.*

## MR. G. B. BROOKS.

Mr. G. B. Brooks, Instructor in Agriculture for the Central Division, is a son of the soil, having first seen the light of day on an Aberdeenshire farm. His native county in Scotland is famous the world over for its Shorthorn and Aberdeen Angus cattle and its Clydesdale horses, and he picked up many points in animal husbandry that proved very useful in after life. The practical side of arable farming was also absorbed by him at an early age, a sound knowledge that was rounded off later by

Plate 41.—Mr. G. B. Brooks, Instructor in Agriculture, Central District.

a course in agricultural science at the Aberdeen University, to be followed by special courses in botany, geology, chemistry, and animal husbandry.

Feeling the urge that most young Scotsmen experience when the call comes for the wider spaces and the greater opportunity, Mr. Brooks migrated to Queensland. In his new environment he soon made good, and afterwards was appointed assistant manager of the Agricultural Experiment Station at Mackay. Here he was given

immediate charge of the Tryon collection of New Guinea sugar-canes, which have had pretty well the same influence on the sugar industry in Queensland as Farrer's wheats have had on grain-growing in Australia. Mr. Brooks was afterwards transferred to the Kamerunga State Nursery, Cairns, where he was faced with the many problems of tropical agriculture. These covered experimental work in the cultivation of tea, coffee, cocoa, rubber, cotton, sugar, and tropical fruits.

When the management of the Biggenden State Farm became vacant Mr. Brooks was selected for the job. His activities there included orchard and vineyard work, and the raising of dairy and pig fodder crops. Mr. Brooks's next move was to the Queensland Agricultural College at Gatton, where he had charge of the agricultural section and, on occasion, acted as Principal.

The position of Agricultural Instructor was then created and Mr. Brooks was selected for the position. The State, for organisation purposes, was subsequently divided into three major agricultural districts, and he became Instructor for the Central Division.

Recently Mr. Brooks was commissioned by the Government to visit Java, for the purpose of studying the latest methods of cassava culture and of procuring cuttings of high-yielding varieties to be grown for the extraction of power alcohol.

Mr. Brooks takes an active interest in all agricultural matters, particularly show work. He visited the Empire Exhibition at Wembley, and while in the Old Country embraced the opportunity of inspecting the many plant-breeding, seed-testing, and animal nutrition stations there. Considerable time was also spent among the stud breeders of Shorthorn and Aberdeen Angus cattle and Clydesdale horses.

Water-finding has been another valuable interest of Mr. Brooks's, and he has carried out much research work in the location of underground streams, more particularly in respect of the influences that operate on the "divining rod" and other mechanical appliances. As a result of these investigations he has designed and patented an automatic water-finder. Mr. Brooks is also a capable writer on agricultural and related subjects.

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*Photo.: Miss J. Easton.*]

PLATE 42.—BELOW THE FOOTHILLS OF THE MACPHERSON RANGE, SOUTHERN QUEENSLAND. A FIELD OF MAIZE ON COOCHIN COOCHIN.

# FARM TRACTORS—BRAKES AND SPEEDS.

By E. T. BROWN.*

Most tractors are fitted with the internal-expanding or external-contracting type of brake. Each is easy to adjust, and should be set in such a way that there is no friction when the brake is not being used, yet it should grip well when it is applied. From time to time it may be necessary to reline the shoes, but this is quite a simple task, and any good amateur can manage it. The best lining to employ is that made of asbestos and brass wire woven together, and this can be obtained from any motor store or garage. Holes should be drilled in the fabric to correspond with the holes in the shoes and copper rivets should be employed. The holes must be countersunk so that the rivet heads will sink well into the fabric. Inattention to the brakes may result in a serious accident and thus they should always be kept correctly adjusted.

## The Correct Speed.

The tendency with all drivers when they realise that they have a powerful engine under them is to get as much speed out of the outfit as possible. It is difficult to conceive of a greater mistake. With ploughing, for instance, a speed of 1½ to 2½ miles an hour is quite sufficient; in fact, in many soils the latter is considerably too fast. Again, on the road the driver should never try to force the speed above that for which the machine is designed. Even a slight increase over the normal will result in an additional strain being put on the machine out of all proportion to the amount of the increase. This added strain will show itself by rapid wear and tear of the working parts.

## Steering.

Steering is not a very strong point with the majority of tractors, and sufficient attention has not been paid by manufacturers to this part of the machine. Much can be done, however, to remedy this defect by paying particular attention to oiling and greasing, also to the correct adjustment of the various working parts. This part of the outfit should be looked to every day without fail. There are two kinds of steering gear in use at the present day, namely, hand and mechanical steering. The first named is effected by means of a wheel on a steering column, working on a worm and pinion drive, with suitable attachment to the front wheel or wheels. Of hand-steering devices there are two in common use. The motor car type (or Ackermann type as it is called) is employed almost exclusively on the lighter makes of tractor, whereas the traction-engine type, or chain barrel form, is generally adopted for the heavier machines. In the case of the Ackermann type of steering, the wheels are mounted on stub axles connected with the ends of the main axle. In the other form the wheels are mounted directly on the main axle, which is pivoted in the centre.

## Mechanical Steering.

To explain the working of the system of steering by mechanical means that is adopted on the majority of track tractors and on some of the two and three-wheeled machines, it is necessary to refer to the differential. Without going into details with reference to this device, it can be stated that by its use one driving wheel is enabled to travel at a faster rate than the other. This, of course, is primarily intended to facilitate the work of turning, for, were not some such contrivance used, one wheel would drag. For steering purposes, it is arranged that either wheel can be braked at will, and in this way the machine can be turned in a very small radius. The tractor is fitted with a wheel and steering column, but instead of acting on the front wheel the movement of the steering wheel either way applies the brake to one or the other driving wheel.

## Automatic Steering.

Tractors that run with all the wheels out of the furrow require a considerable amount of steering. To overcome the disadvantage of the driver devoting too much attention to this point, many makes of machines are fitted with a device for automatic steering. This consists of a small furrow wheel attached to the off-side front wheel. It is a very simple attachment, yet one that answers the purpose admirably. It saves the driver a great amount of trouble, and in some cases makes it possible to dispense with an extra attendant for the outfit.

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* In "The Farmer and Settler."

# REARING QUEEN BEES.

## HINTS ON THE SELECTION OF STOCK.

By RUPERT HOLMES, Instructor in Poultry Raising and Bee-keeping at the Queensland Agricultural High School and College, Gatton.

There is a growing tendency among bee-keepers to rear their own queens, not only on account of the saving of the purchase price, but because the bee-keeper who has pure stock can, by careful selection, improve his strain by breeding from his most desirable colonies. Annual requeening is now recognised as not only desirable but very necessary. The ordinary equipment, common in every apiary, is sufficient for the rearing of queens for home use. Bee-keepers who wish to rear a large quantity of queens each season usually prefer special equipment and adopt the methods of the professional queen-breeder.

Of first importance is the stock from which the queens are to be reared. In every apiary there are usually one or two colonies which produce an unusually large crop of honey. This fact alone is not sufficient to prove that the colonies should be used for breeding purposes. Unless the queen is pure and purely mated, as indicated by the evenness in colour and size of her offspring, and of her daughter's drones, then the bee-keeper cannot hope to find her desirable qualities transmitted. Other qualities, such as comparative gentleness of the workers, quietness on the comb, size, resistance to bee diseases, a non-swarming tendency and perhaps length of tongue, should all influence the bee-keeper in his selection of breeding stock. Since it is impractical to control mating, attention should also be given to the selection of drones. By giving the most desirable colonies plenty of drone comb, by restricting the amount of drone comb in undesirable colonies, and by trapping the undesirable drones, any bee-keeper may increase the probability of desirable mating.

### The Time to Begin.

For best results the bee-keeper should commence to rear queens towards the beginning of the honey flow. At this time it is easiest to imitate the natural conditions under which queen-cells are normally produced—namely, the development of the swarming impulse, or the condition of the queenlessness. When ready to commence queen-rearing, say, about September, October, or November, the breeder-colony is prepared by temporarily removing from the brood nest all available egg-laying space. An empty comb in which no brood has been reared is then placed in the centre of the brood-nest and allowed to remain five days.

At the end of this time the comb should be filled with eggs, many of which will be just hatching, and therefore of the right age for queen-cell material. On the morning of the fifth day a nurse-colony or cell-building colony should be prepared. A colony which is just preparing to swarm will serve the purpose or one that is trying to supersede its queen, but the best results will be obtained when a colony is specially prepared for the occasion. The cell-building colony must be full of young bees and queenless. To prepare this colony, several combs of emerging brood, without bees, may be put in a hive body above a queen-excluder for three to five hours. The colonies from which the brood is selected for this purpose should be overflowing with bees or of swarming strength. Three to five hours after the combs of emerging brood have been "put up" they will be covered with young nurse-bees, and the nurse-colony is then prepared by placing the combs with their accompanying bees in a one-story brood nest. It is essential to make sure that no queen or queen-cells are present in this nurse-colony. It is also well to put grass in the entrance of the nurse-colony, to prevent the return of any bees to their former locations. Two combs containing nectar and a comb containing pollen should be placed in the brood-chamber of the nurse colony. In addition, when the nurse-colony is made up it is well to sprinkle the tops of the frames with sugar syrup made of equal parts of sugar and water. Having made up the nurse-colony on the morning of the fifth day, the comb which was placed in the breeder colony five days previously, and which now contains hatching eggs and day-old larvæ, is prepared during the afternoon for the nurse-colony.

### Preparing the Comb.

The method of preparation of the comb, although simple, requires care. The tiny larvæ are readily affected by excess heat, and should not be kept in the sunlight too long. If exposed to the wind they dry up quickly. They should not be kept out of the hive more than ten minutes. No matter how carefully other directions are followed, if the larvæ are damaged in preparation the remainder of the process is wasted effort. Observing the precautions mentioned, the comb of the cell material is prepared by destroying every alternate row of cells with a match.

The prepared comb is then taken to the nurse-colony and placed, prepared side downward, over an empty frame on the top bars, or on blocks of wood to raise the

prepared side of the comb at least 1 inch above the top bars. This space is to allow the bees to draw out the queen cells. A piece of canvas is placed over the comb of cell material with an empty super on top, filled with packing material to conserve the heat.

Four days later the bee-keeper will be able to tell how many queen-cells to expect, for all that are to be finished will be started by that time. Under no conditions should the nurse-colony be jarred or bumped while the cell material is being cared for by the bees. It is possible to get from eighty to one hundred queen cells from one comb of cell material by this method if the conditions are right. Twenty to forty cells are commonly made. When following this plan it is well to leave the cells with the nurse-colony until they are ripe or ready to hatch within the next twenty-four to forty-eight hours. This will be ten days after the nurse-colony receives the cell material. The ripe cells must be protected or removed before any of their inmates emerge, or else all are likely to be destroyed by the first emerging queens.

**Queen-Mating Nuclei.**

If the colonies to be requeened are of hybrid stock, it is desirable that the queen be mated to pure drones before being introduced, otherwise little progress in improving the quality of the stock can be accomplished. Queen-mating nuclei can be made from standard hives by putting in either two or three partitions, thus dividing the hives into either three or four compartments of two frames each. Each compartment must be made "bee-tight" from the one adjoining, and each compartment must be given an entrance on a different side from that of the adjoining compartment. When the nucleus is made up and given a queen-cell (taken from the nurse-colony) the entrance is closed with gauze so that no bees will desert; it is also well to put a piece of queen-excluding zinc over the entrance to the nucleus in case of robbing. On the day that the queen-cells are ripe, a nucleus may be made in each compartment by placing therein two combs taken from extra strong colonies—one comb of emerging brood with enough young bees to cover but without queen or queen cells, together with one comb partly filled with honey. The comb of brood is placed in the nucleus chamber next to the partition, and a queen-cell which has been cut out of the comb of cells from the nurse-colony may be fastened to this comb of brood on the side toward the partition.

Fasten the queen cell in place with a portion of comb which has been cut out of the side of the base of the queen cell. If these nuclei are made from strong coloniesa of warming strength, and if plenty of nectar is being gathered at the time, cell-protectors will not be necessary. If there is no honey flow in progress when the nuclei are being made up, the colonies from which the nuclei are made should be fed for the two or three days previous to the operation, and the nuclei should also be fed. Within two weeks after the ripe cell is placed in the nucleus the queen should be mated and laying eggs; she can then be introduced into the colony which is to be requeened. Much in the difficulty and labour of requeening comes from the work of finding the old queen. This work can be greatly facilitated by temporarily placing the brood-nest, in which the queen is laying, on another bottom board at the side of the old stand during the middle of the day. In a few hours the field bees in the hive will have returned to the old stand, leaving only young bees with the queen, in which case she is usually to be found with ease.

**Introducing the Young Queen.**

After finding and killing the old queen the brood-nest is to be returned to the old stand, and the young queen introduced by any one of the following methods:—

*The Wire Cage Method.*—Inexpensive wire cages may be purchased ready made or they may be made at home, as follows:—Secure blocks of wood, each ⅜ inch thick by 1½ inch wide by 2½ inches long, and wrap a piece of wire screen 6 inches square tightly around one block; fasten with a tack. The other block is slipped into the opened end of wire screen thus made. The loose end of the screen tube is wrapped with fine wire just tightly enough to allow the loose block to be removed when desired.

To cage the queen the loose block is removed, the queen is placed in the hand below the cage, and immediately crawls up into the cage. The cage is then closed with the loose block and placed between the centre combs in the brood-nest. After twenty-four to forty-eight hours the queen is released from the cage.

*The Smoke Method.*—When queens are introduced by the smoke method a return trip at the end of twenty-four to forty-eight hours is unnecessary. In the first place the hive must be made air-tight. A standard hive in good state of repair seldom needs attention. The smoker should contain plenty of well-lighted fuel; a wad of green grass packed in the top of the smoker will cool the smoke nicely. When ready the hive entrance is closed to 1 inch in width, and the bees are smoked until they can be heard to "roar" distinctly. The entrance is then closed completely and remains

closed for about twenty seconds. The entrance is then opened enough to admit the opened end of the queen cage. A puff of smoke will then drive the queen out of the cage into the hive, while another three or four good puffs of smoke should complete the confusion.

The entrance is again closed for about three minutes, depending on the size of the colony and the temper of the bees. It must be understood that the colony which is being requeened is to contain neither a queen nor queen-cells at the time. If otherwise, the new queen will be immediately destroyed. It is convenient to introduce the new queen as soon as the old queen has been killed. If this is not possible and the colony remains queenless forty-eight hours or more, every comb must be carefully inspected for queen-cells before the new queen is introduced.

In all cases the colony should not be manipulated or opened within a week after introducing the new queen. A slight disturbance may cause the bees to ball and kill the new queen.

Queen introduction is very successful during a honey flow.

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## PARASITIC WORMS OF POULTRY.

By P. RUMBALL, Poultry Instructor.

*In response to repeated inquiries for information on this subject, the following notes are reprinted from the Journal for March,* 1926:—

A LARGE number of animal parasites are found in the digestive tract of poultry, some of which cause serious disturbances of the digestive functions, while others again are apparently harmless. Those principally met with, however, can be classed as round worms (nematoda) and tape worms (Cestoda). The former variety, by reason of the fact that they are the most common, claim prior attention. Various varieties are found in the crop and provintriculus or glandular stomach, gizzard, intestines (both upper and lower portions), and the ceaca or blind gut. The latter variety are responsible for serious losses and are particularly hard to expel. The accompanying plates should give poultry breeders some idea to what extent infestation is possible.

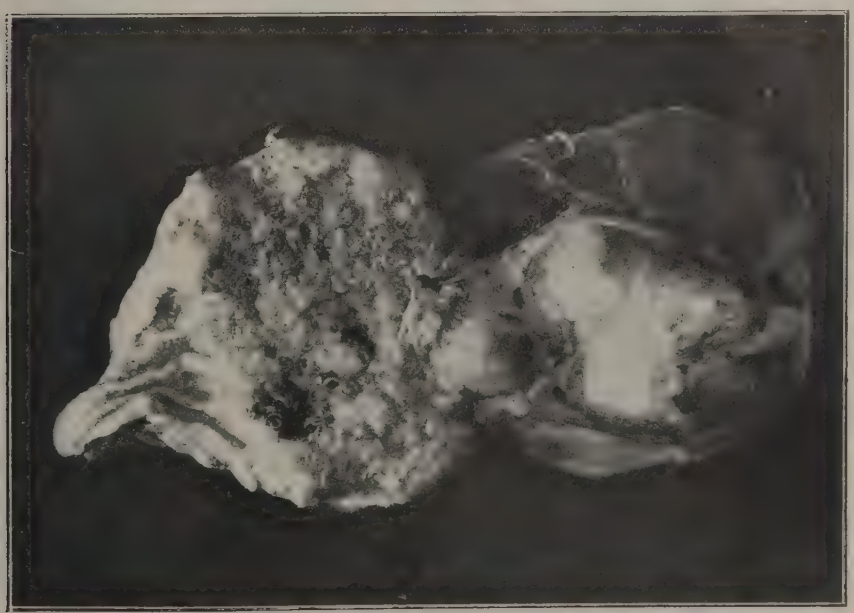

Plate 43.—Dispharagus Nasutus which Infests the Provintriculus or Stomach of Fowl (natural size).

That portion of the digestive tract between the crop and gizzard known as the provintriculus, or glandular stomach, is shown in Plate 1, heavily infested with worms. These worms were more or less encysted in the walls of the stomach, causing ulceration and eventually rupture.

Plate 44.—Spiroptera Hamulasa, Gizzard Worm of Fowl (natural size).

From the above plates the nodules caused by the gizzard worm are illustrated. On examination of the lining of the gizzard perforation will be noticed, and on removal of the lining the end of the worm will frequently be seen protruding from the muscular tissue. They are difficult to extract complete and vary considerably in size.

Plate 45.—Gizzard Worm (natural size).


Plate 46.—Intestine of Orpington Hen which died of stoppage due to Tumour and Balling of Worms.

This plate illustrates possibly one of the most common of intestinal parasites met with in poultry, and also the harm ensuing on their unchecked multiplication. In all probability the tumourous growth was due to parasitical infestation.

**Life History of Round Worms.**

It is not intended to trace in detail the life history of the various round worms found in poultry—in fact, in many cases it is unknown—but briefly with those most frequently met with. The adult female lays her egg in the digestive tract, which is voided in the excreta. This egg undergoes portion of its development in the soil, enters the digestive tract of poultry by adhering to portions of food, and there completes development. In order that correct development of the embryo worm takes place while it is in the soil, moisture is necessary, which accounts for the more general infestation met with in damp and wet yards. Numerous post mortem examinations have been made by the writer of unthrifty stock due to the presence of worms, and from conditions disclosed he is forced to the conclusion that propagation may take place by certain varieties of worms in the infested host itself. A study of the illustration lends colour to some extent to this theory.

Plate 47.—Long Round Worms (natural size) which were Removed from Intestines of Bird illustrated in the Plate on the preceding Page.

**Preventive Methods to be Adopted to Avoid Infestation.**

Having a general idea of the life history of round worms, what action can be taken to prevent general infestation? As worms are spread from bird to bird by eggs, infested stock should never be brought on to relatively clean premises. As the eggs are found in the excreta from infested stock, particular attention should be devoted to the regular cleaning up of droppings; by doing so you not only assist in preventing the spread of worms, but preserve your fowl manure in its most valuable form. It is impossible to thoroughly clean the runs attached to poultry buildings, but they can be spaded over occasionally and, where accommodation allows, spelled. The feeding of all mash foods, foods to which eggs would readily adhere, should be done in suitable receptacles, and where large numbers of birds are yarded together several should be provided to prevent portions of the mash from being spread about the yard.

Worm-infested stock are poor producers, and where infestation is severe the vitality of the birds is lowered, rendering them more susceptible to disease. Young chickens when hatched are of necessity free, and every effort should be made to maintain them in this condition, particularly so during their growing stage. To do this they should be reared on ground which has not been fouled by adult stock. Do not make use of chicken rearing pens, brooder houses, &c., as temporary quarters for stock of any kind; by strictly adhering to this principle it is possible to place in the laying pens well developed stock that will give results. On the other hand, if growing

Plate 48.—Drepanidotænia infundibuliformis.

*a.*—Worm;

*b.*—An inverted piece of chickens intestine with numerous tapeworms attached.

stock become infested their growth is retarded and their vitality so lowered that they fall easy victims to diseases of an epizootic nature, such as roup and chicken pox, both of which are prevalent during the growing period and frequently assume a more virulent form with this class of stock.

**Diagnosis.**

The symptoms which indicate the presence of worms are not very characteristic. The birds become dull, weak, emaciated, and sunken in face, losing all colour both in head and legs. The plumage loses its lustre and becomes roughened. Where infestation is not severe they are ravenous, but with the increase of worms their appetite diminishes, and they have no inclination to look for food. Their walk becomes stiff, and diarrhœa is often present. Generally birds infested with worms have the appearance of suffering from some chronic disease.

**Medicinal Treatment.**

Too much reliance must not be placed on the ease with which worms can be expelled by medicaments, as the best are only partially effective. Therefore it should be the aim of producers to avoid infestation by every means in their power. Santonin is undoubtedly the best vermifuge, but, unfortunately, it is too costly for general use. If used, give at the rate of 1 to 5 grains per bird in the mash. Tobacco dust has been used also with some degree of success by mixing 1 lb. with every 50 lb. of mash.

Medicated oil of turpentine mixed with equal quantities of cotton seed oil or linseed oil can be given by means of a syringe, in doses of one or two teaspoonfuls according to the age of stock. In administering this, every care must be taken to prevent its entering the wind pipe.

Before administering any of the following, fast the birds for twenty-four hours, then follow treatment in two hours by giving Epsom salts at the rate of 1 oz. to fifteen adult or twenty half-grown birds.

**Tape Worms.**

There are many species of tape worms found in fowls. They, however, cause little trouble owing to severe infestation being rare. The tape worm requires an intermediary host. One of the species infesting poultry has for its intermediary host the common house fly, and another the earth worm. An excellent treatment for tape worms is oil of male fern, areca nut, or powdered pomegranate root bark. A heaped teaspoonful of the latter added to the mash for fifty birds occasionally will keep stock free from tape worms. Areca nut given in the mash at the rate of 10 grains per bird is also efficient, while oil of male fern should be given at the rate of 10 drops per bird. However, before administering any of the above the birds should miss a feed and medicinal treatment should be followed by a purge in two hours.

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## PIGS AT THE BRISBANE SHOW.

E. J. SHELTON, Instructor in Pig Raising.

The pig section certainly will be a most interesting one this year, for in addition to the splendid display of Berkshires, Yorkshires, Tamworths, Poland-Chinas, Duroc-Jerseys, Gloucester Old Spots, Large Blacks, and Porkers, there will be a very fine display of eleven pens of prime quality bacon pigs competing in the Bacon Pig Carcase Contest, also several very fine litters competing in the Litter Weight Contest, while as an added attraction, a sow and litter will be displayed, the litter being about 5½ months old, ten pigs in number, with a total live weight very close to 2,240 lb., or an average of pretty close to 240 lb. each—a ton litter in every sense of the word. Of course, it is realised the market does not call for these heavy weight pigs, but the ton litter is being exhibited to demonstrate what is possible if the pigs are handled along correct lines, and are fed from birth on the foods available on any farm where special attention is given to these matters.

There will also, of course, be many other sows and litters shown, as well as champion prize winning pigs from various parts of the State. There will be the usual Young Judges' Competition in this section also, while the instructors in pig raising will be in attendance for part of each day to meet breeders and to discuss with them matters of mutual interest. The office of the Instructor in Pig Raising will be quite close to the Pig Section, and messages could be left there, or at the Agricultural Department's Court, arranging appointments, so that there should be no necessity to disappoint breeders desirous of meeting those whose special business it is to assist them.

**Farm Boys' Camp.**

Another special attraction at this year's Exhibition of particular interest to members of pig clubs is the Farm Boys' Camp.

Twenty-four specially selected boys, members of Pig Clubs in different districts in Southern Queensland, have been invited to become the guests of the Royal National Agricultural Association for Exhibition week. A camp manager (Mr. Williams, of Maryborough) has been appointed to take charge of the boys, who will be comfortably housed on the Show Ground, and will, each day, visit certain sections of the Exhibition to meet the judges and others interested, and have a general talk about the exhibits in that particular section. At one or other of the meals each day, also, some prominent authority will speak to the lads for a few minutes, and they will have an opportunity of meeting, and listening to, many prominent people in the live stock world, whom they would otherwise probably not be able to meet at all.

This scheme is being fostered, not only by the Royal National folk, but also by the officers of the Department of Agriculture and Stock, and of Public Instruction, for it is to be an educational treat for these boys, such as a good many older folk would be mighty pleased to have, and would be prepared to pay a substantial premium to be able to enjoy. It is but another indication of the attention being given to these matters by those most interested in progressive educational extension.

**The Pork Products Displays.**

Nobody should miss seeing the wonderful displays in the Meat Industry Hall and in the Court of the Department of Agriculture and Stock, and the annexe, for in these sections special displays of pork products are being arranged. In the Meat Industry Hall, quite an extensive display will be staged, not only of manufactured products but also of fresh pork and of the carcases of one each of the pens competing in the Bacon Pig Carcase Contest. One could say, in all fairness to other sections, that the remarkable displays in the Meat Industry Hall last year were equal to anything that had been staged in any part of Australia, or even of other countries, and this year's displays are to be even better than last year's. The pork

products display in the Agricultural Department's Court, whilst not so extensive, will be of much educational value, and be well worth a special visit.

Altogether, there will be so much of interest and educational value at this big show that everyone who can possibly manage it should make a point of attending.

The displays of bacon, ham, and other pork products in the Dairy Produce Section, in the Trade Displays, and in the District and One Man Farm Exhibits, will be well worth seeing too, for they are of the very best it is possible to produce.

## VALUABLE STUD PIGS.

### SOW AND LITTER REALISES 720 GUINEAS.

Recent reports from the British Isles indicate that since the termination of the World War pedigree pig breeding has increased to a marvellous extent in the homeland, one firm of auctioneers alone (Messrs. John Thornton and Co.) reporting that they have handled no fewer than 50,000 pigs through their sale rings during the past nine years.

Special attention is called to the following records obtained at auction sale in the British Isles during recent years:—

Highest price for a sow and litter of any breed—720 guineas.

Highest price for single pig of any breed—700 guineas.

Highest average for a sale of any breed of pigs, 82 head averaged £122 15s. 2d.

The following are but a few of the very high prices paid for stud pigs during the years 1920 to 1927:—

Boars.—During this period, boars in the following breeds have realised prices as follows:—Large Blacks, 570, 550, 220, and 170 guineas. Middle Yorkshires have realised 300 and 100 guineas. Large Yorkshire boars have realised 210, 150, and 100 guineas.

In sows, the top price was 720 guineas for a sow and litter at the sale of Lord Rosebery's stud in 1920. Other high prices in this breed were 340 and 170 guineas, paid in 1926 and 1927. The highest priced Gloucester Old Spot sow was one of Captain H. P. Hamilton's sows, sold in 1921 for 520 guineas. Mr. H. Groom sold, in 1922, one Large Black sow for 500 guineas. One of Mr. Robert Ibbotson's Tamworth sows sold in 1924 for 200 guineas, while in 1923 and 1925 two Middle Yorkshire sows realised 160 and 115 guineas. Two large White sows, sold in 1926 and 1927, realised 340 and 170 guineas respectively, and belonged to Mr. E. Wherry and Mr. G. Payne, well-known British breeders.

Berkshires also have realised exceedingly high figures, the top figure being reported in 1920, when the Duke of Westminster sold one Berkshire sow for 610 guineas. At the Reading Show sales in 1921 a Berkshire sow realised 400 guineas, while during 1919, at the same saleyard, 320 guineas were accepted for a selected Berkshire sow of excellent type and quality. Other sows realising high figures in this breed were disposed of at auction at 190, 130, 60, 66, and 46 guineas.

In Berkshire boars the top price reported was received at the Reading sales in 1920, when a boar realised 370 guineas; during 1921 and 1922 two boars sold at 200 guineas each, while during the years from 1923 to 1927 sales were reported at 76, 62, 75, 71, and 80 guineas.

Tamworth pigs did not appear to command such high figures, though the late Mr. Robert Ibbotson topped the boar sales with 150 guineas, also the sow sale with 200 guineas, both sales being reported in 1924. Major J. A. Morrison sold a boar in 1927 for 78 guineas and a sow for 42 guineas; while Mr. E. de Hamel, in 1920, secured 110 guineas for a choice quality young sow. Prices from 20 to 75 guineas were common during the periods named.

In Large Blacks Mr. T. F. Hooley sold a champion sow in 1920 for 700 guineas, while in 1922 Mr. H. Groom topped the sales with 500 guineas. Prices realised for other sows were as follows:—240, 220, 115, 100, 70, 60, and 42 guineas. In boars, prices were very high, as the following will indicate:—570, 380, 290, 280, 220, 170, 48, and 42 guineas.

Gloucester Old Spot pigs were in good request, and included among the highest prices paid for these were 600 guineas in 1919 at the R.A.S.E. sale for a boar, and 400 guineas at the same sale for a sow. Other high-priced boars realised 320, 200, 150, 75, 35, 32, 25, and 24 guineas. Other high-priced sows realised 320, 57, 30, and 20 guineas.

Prices like these would do a great deal to popularise stud pig breeding in Australia, though it is doubtful if the sale price of the young stock here warrants such high values. Prices, however, have improved remarkably during recent years for specially selected animals.

PLATE 49.—"COONONG MASTERSTROKE": AGE, FOURTEEN MONTHS.

Purchased by Department of Agriculture and Stock for Gindie State Farm Beef Shorthorn Stud. Sire, "Milton's Masterkey"; Dam, "Milton's Strawberry 2nd," by "Masterkey" (imp.) Photographed at Yeerongpilly Stock Experiment Station, twenty-seven days after inoculation for tick fever with "recovered" blood. Note his alert appearance after the ordeal.

# THE CULT OF THE COLT.*

By "U 9 L."

## Putting on the Gear.

Now that we have the colt in hand is the time when bits of skin are occasionally displaced and odd scraps of hair sent flying. It's not done on purpose, of course, but such things will happen and we must be prepared for 'em. Many preparations are good, and among the best of them is a mixture of fat and kerosene in equal quantities. That's easy to make, it acts as a balm, as a hair restorer, and it softens the skin to effect easy healing. It's just as well to have a jam-tin of it, or, some other old tin, handy to use.

## The First Thing.

Let's get to the colt. The first thing in handling a youngster is to get right in on him. Lean your body against his, stand close all the time and use your own body as well as your hands in the handling process. It's safer so, any way. A man who stands well away is at a disadvantage. In the first place, it has a bad mental effect on the colt. It gives him the impression you're afraid of him, which isn't a bad guess on his part, and from a distance you may only converse with the thing over a 'phone, as it were. When you're standing in, leaning against the colt, you're in communion with him. You both gain mutual confidence from that proximity, and should he have evil intentions you pick up that malicious thought quickly and, if you're man enough, you stifle it at its birth. Also, if the thing is going to bound forward and kick or do something else which isn't in the lexicon of good manners, he's going to push you well clear during that bound if you're leaning against him. If you're standing out clear the colt's got free passage-way to jump ahead and regard you as an Aunt Sally as he passes. Get in close and stay in—that's a standing rule without exception right through the whole curriculum of the colt's training.

## Treat the Colt Kindly.

One of the first things to do as soon as the colt is accustomed to us standing beside him is to bag him. An empty sugar bag is just the thing for the purpose. First get in close. Pardon that repetition, will you? It's the first rung of the ladder, and almost is it the whole foundation of success. Get in and keep in. You've a close hold on the halter-shank with your left hand, and with the right you commence to rub the youngster over with the bag. He'll flinch a bit, but very little. You'll rub him all over the near side, flap it over his back to the off side, and as the thing reaches the stage of ignoring the flapping bag you'll take further liberties with it. Holding the bag by one corner you'll commence to swing it wider of the colt and bring it in with a flick. Gradually you'll work over his rump and down his buttocks, and then you get a double-action flick—under his belly and over his back in one broken sweep. You pay attention to every part of his body, off-side as well as near, and you flap him till he ignores the thing completely.

But, whatever else you neglect to do, don't forget the mental effect you produce. Treat the colt in a friendly fashion, almost in a casual manner, and let him know you're not afraid and desire a reciprocity of feeling from him. For instance, and just to state a case: You're leaving the yard, we'll say, to attend to something else. Instead of laying things down carefully and treating the bag and colt as though they were flimsy egg-shells, throw the bag over his back or neck as you turn to leave, and do it as though it was a natural action and the proper thing to do. Colts are wise birds in their own little way—make no mistake about that—and the man who relies on physical effort alone when dealing with them is unnecessarily adding to his labours and making a drudgery of what should be a pleasure.

## Pick up his Feet.

If you wish you may now put the roller and bearing reins on him, or you may go on with a little more handling. Let's pick up his feet first. Any of these things may be inflicted on the colt at any stage of his education. But it's got to be done,

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* From the "Pastoral Review" for April. Previous notes on this subject by the same well-informed writer were reprinted in the March "Journal" from the February number of the "Pastoral Review."

and the more we handle him the easier he is to handle. We'll pick up his feet. Get in close—I've said that before, haven't I?—and take a close hold of the halter-shank. If you grip that within an inch or two of the colt's cheek it's a form of insurance. The thing can't jump forward without its head going also, and if you've a good hold you also are lifted out of harm's way. For either of the front feet we stand in close and rub up and down that particular front leg with our foot. The thing may stamp a couple of times and otherwise show its displeasure, but it'll accustom itself to the process in a mere bit of time.

When it suffers our foot going up and down its leg we'll work the toe of our foot under its fetlock and lift. That may, or it may not, lift the colt's foot from the ground. It's immaterial, in any case. All our foot is doing is accustoming the youngster to us fooling about its legs. We're in a better position to protect ourselves while standing beside the colt than we would be did we lean down to lift its foot for a start, and in that way do we run less risk. In much the same way do we lift the hind foot, using our own foot first as a means to introduce our hand. It's easy—dead easy—and reduces the minimum of risk to a maximum of safety. After lifting each foot a couple of times we'll let it stop at that. There's no need to make drudgery of any one lesson. Those feet have to be lifted a dozen scores of times in the breaking process, and once the way is open the rest is easy. See?

## "Mouthing Bits" Condemned.

Now we put on the roller, the bearing-reins and the mouthing bit. We've bagged the colt previously, and before we slip the roller over his back we'll bag him again for a second or two. First, though, we've put on the bridle and introduced the bit to his mouth. Let me have a word or two to say about mouthing-bits, will you? We've all seen weird contraptions which pass as mouthing-bits. Almost, when a man sees some of them, he's inclined to think of the instruments of the Inquisition. They're not bits at all—they're things of fiendish torture! Why do they make such things? A colt's mouth is a tender thing, a dainty bit of mechanism deserving care. And yet you'll see fiendishly-shaped metal things specially made to inflict pain and torment! When you yourself are breaking in a new pair of boots does it add to the later comfort of those boots to put some grains of gravel in them while you walk about? Don't be silly, you'll say. I say it's not silly. If we put danglers on mouthing bits, curiously curved iron in the bit itself, and all sorts of other abnormalities, then if that's good for the colt the gravel's good for the man. There, now!

Anything, however, plain and simple it is, will cause the colt to chew and mouth himself. I always used an ordinary snaffle bit, a shade heavier than usual, perhaps, and after the first few hours I'd wrap rag soaked in that kerosene-fat mixture round the bit so it wouldn't bruise the tender young jaws. Don't try and tell me the thing won't work. I've run down a dingo in thick old-man gidyea on a green colt of my own breaking. He was a good colt, and my old heart goes out to him now even after this lapse of time, but you'll admit, apart from everything else, he was mouthed. Look, if you love your horses at all, and if you have any respect for your own humanity, throw away those fiendish mouthing bits, made only to inflict torture, and use something easier on the colt and which has common sense as a foundation of its build. I have finished, without promising I won't revert to the matter, and we'll get on with our work.

## Slipping on the Gear.

The colt stands easy enough while we slip the roller on him. The more bits of straps and other gadgets this has hanging about it the better I like it. Half of them mightn't be any use, and the other half may be almost unnecessary from a utilitarian point of view, but they're all educational. The more stuff we can have flapping about the colt the better it is for him and for us—it all does its little bit towards quietening him.

While you're slipping the roller on just let your eyes and hands feel every part of it. Particularly, please, see that it's soft with oil. It's an abominable thing to put a sweat-caked rig on the tender skin of a young colt. Goodness knows, the thing will chafe easily enough without us going out of our way to add to its discomfort. Though we may never use a crupper in his working life, the colt has to have a crupper now, and see that the loop of that crupper is soft and pliable as a bit of silk. Owing to the bagging he's received the colt almost ignores the gear going on him. But when we tighten the girth it's a new sensation. That tightening of

the girth is, in over 90 per cent. of cases, the inducement to buck. I've ridden horses bareback which took no notice of men, and yet when the girth's been laced round them they've hoisted—yea, they've gone up where the birds fly! And again, a case of which I might tell you when dealing with anecdotes and incidents, I've known a bad mare so girth-proud that she wouldn't, or couldn't, buck till she'd accustomed hereself to the feel of the girths.

### A Warning.

All that's merely a warning to be careful when you're tightening the girths of the roller when first putting it on our colt. It has to be done, and we've got to do it. After you've tightened the girth to a reasonable extent let the colt move about the yard a bit before putting on the crupper and lacing the breastplate through the surcingle. That's just to accustom him to the feel of it, and so he may stand in more or less comfort while you see to the rest of the gear. When he's standing at ease you may adjust the surcingle and breastplate. There's only one warning I'd give in this: Please see that both surcingle and girth are approximately of the same degree of tightness, and for the love of goodness don't have a welt of flesh oozing out between them in much the same manner that dough squeezes through a cook's fingers. There's no better way of bringing about a severe gall than by showing culpable neglect in this.

The crupper's got to go on, and it's a delicate operation. Really, you know, it's not nearly as hard as it looks, and the danger's so slight that it's next to nothing. It's the fact of playing about a powder magazine which prompts the fear of an explosion. Take the rein in your mouth, gripping strongly with your teeth, after pulling the colt's head round. That gives you both hands free, and if you stand in close and hold tight with your teeth almost you're as safe as if you were in bed. Take this from me, as coming from one who knows: the danger is only in ratio to your fear.

Anyway, the colt's tackled, all the gear fitting nicely, none of it too tight, and the bearing reins are buckled back to the roller. The colt walks round and round, restlessly champing the bit, and can we go and leave him? We can't! We've got to keep coming back to that fellow ever so often, comforting him with our presence, handling him for no other reason that it's part of his education, and always and for ever we're at that patient's beck and call while we have him under treatment.

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## ABSTRACTS AND REVIEWS.

### Bagasse as a Source of Industrial Alcohol.

Wm. L. Owen and Wm. P. Denson. ("The Planter," 1928, 80, 61-64, 83-85 102-105.)

Within the last few years the demand for bagasse in Louisiana for the manufacture of fibre board has grown with such astonishing rapidity that it seems within the realm of possibility that at no very distant period practically all of her bagasse will be used for that purpose. But its residual sugars contribute nothing to the purpose in view. Since these sugars give to bagasse a potential yield of 5 to 7 gals. of alcohol per ton, and are actually detrimental to the making of the board, it seems desirable to utilise them for the production of spirit, rather than lose them by leaching, or by the action of micro-organisms during storage. A preliminary investigation has very clearly demonstrated two things, viz.:—(1) That the fermentable sugars in bagasse can be very efficiently converted into alcohol by fermentation; and (2) that the addition of bagasse to fermenting solution tends to accelerate the rate of fermentation even where it does not increase the yields of alcohol from the sugars present. These investigations have now been continued, various factors being studied, as the effect of adding bagasse on the rate of fermentation of molasses worts of high density, effect of the fineness of the bagasse, the effect of the removal of the bagasse after the initial period on the rate of fermentation, and the effect of percolating fermenting wort over bagasse. As the result of this experimental work, details of which need not be given here, it is concluded that: "Where bagasse is used in molasses distilleries for the purpose of recovering its residual sugars as well as accelerating the fermentation of worts of high concentrations, the following would

be the procedure: The spent or exhausted chips of bagasse may be taken from the fermenting vats where they are separated from the wash, by screening or filter-pressing, and conveyed to vinegar generators where they are used just as wood shavings are used in vinegar plants. They may then be impregnated with a vinegar culture obtained from a previous run, and a dilute of alcohol solution, or preferably some of the diluted wash percolated through them. After operating through a cycle, the chips can be dried in the sun, and baled for use as a fibre board. Since only a low concentration of acetic acid is necessary for the prevention of mould growth, the time required for the material to pass through the generators should only be a few hours.'' In the light of the foregoing experimental results the authors then inquire what the value of bagasse would be in molasses distilleries compared with the present market value of fibre board. Calculated on the increase in alcohol yield from molasses wort of the usual setting density of 17 degrees Brix, it would be from 3 to 6 dollars per ton. In addition to this, would be the saving in time of fermentation, which would be at least one-third of that required under ordinary conditions. When we calculate the value of bagasse, however, for the fermentation of more concentrated worts, of from 33 to 40 degrees Brix, the above figures are greatly increased. In the latter case the value of bagasse enables one to do what would be impossible without it, or some other similarly acting substance. Increases in yield have amounted to 30 gallons of absolute alcohol, over the best obtained without it, giving a ton of bagasse the value of 100 gallons of black strap. In addition, the recovery of fertiliser from the slops becomes comparatively easy when the molasses is set up at that density. The present market value of bagasse for fibre board is based on the fuel oil required to take the place of the former in supplying the fuel for the operation of the mill. Taking as an average 220 lb. of wet bagasse, the operator received 4.20 dollars a ton for it, and in addition a small bonus. It would seem from this investigation that bagasse would be at least of equal value to the distiller, who, after utilising it for his purpose, could dispose of it to the fibre board manufacturer in a better condition for that purpose than when he received it.

## "The Fruitful Granite."

By Hector Dinning (author of ''By-Ways on Service''; ''Nile to Aleppo''), with a Preface by The Rt. Hon. Lieut.-Col. Sir Matthew Nathan, P.C., G.C.M.G., formerly Governor of Queensland.

This is a book by a writer of considerable experience—who already has two books to his credit—about the life and work of an orchardist on the Granite Tableland of Stanthorpe.

This is a unique countryside; unique in its climate and in its products, and even in its people. These characteristic qualities should be better known by Australians, and especially, perhaps, by Queenslanders—though, as Sir Matthew Nathan says in his preface, it is a book that should interest Englishmen, too. The author in these pages has reproduced the atmosphere of this locality, and has shown, besides, how the people engaged in fruitgrowing there react to it.

The story of the actual work of fruitgrowing in all seasons has been faithfully told in great detail—its pleasures and its pains, its risks, and their compensations. But this is no work based on hearsay. As the preface says: ''The Fruitful Granite bears the impress of a truthful relation of actual experiences.''

It should appeal not only to city dwellers—as giving them a picture of a life outside their own experience—but to all land-workers in other branches, who are always interested by stories of the craft of primary production that offer points of difference from their own.

The author, Mr. Dinning, is a young Queenslander and a graduate of the Queensland University. He was with the A.I.F. on Gallipoli, in France, and with the Australian Light Horse in their epic advance to victory in the Palestine campaign, and returned home with the rank of Captain. His earlier books won strongly favourable notice in both the British and Australian Press. He is also well known as a writer of vivid and virile sketches in Australian daily and periodical journals. His long experience as a fruitgrower in the Stanthorpe district is the basis upon which he has written a book of delightful and arresting interest.

Our copy is from the publishers, The Carter-Watson Co., Ltd., T. & G. Building, Queen street, Brisbane.

# General Notes.

**Prohibition—Introduction of Infected or Suspected Swine.**

Owing to the existence of swine fever in other States of the Commonwealth, an Order in Council was issued on the 14th July, 1927, prohibiting, for a period of twelve months, the introduction into Queensland of infected or suspected swine from New South Wales, Victoria, South Australia, Western Australia, and Tasmania. It has now been considered necessary to extend the prohibition for a further period of twelve months as from 14th July, 1928, and an Order in Council has been issued to that effect. This Order does not affect introduction of bacon, hams, and cured or dressed pork. Healthy pigs for immediate slaughter may, with the approval of the Minister, be admitted.

**Staff Changes and Appointments.**

Mr. Geo. Tait has been appointed Assistant Cane Tester at the Kalamia Mill for the 1928 sugar season.

Mr. J. McG. Wills, of Nerang, has been appointed Honorary Inspector under the Diseases in Plants Acts.

It has been approved that Mr. R. J. T. Kidd, Inspector of Stock, Mackay, be transferred to Normanton, and that Mr. D. A. Logan, Inspector of Stock, Normanton, take Mr. Kidd's place at Mackay.

Mr. J. C. Pryde has been appointed Temporary Inspector of Slaughter-houses at Warwick as from 9th July, 1928, to 18th August, 1928.

The following have been appointed Temporary Inspectors under the Diseases in Plants Acts for the purpose of inspecting banana plantations in connection with the Bunchy Top investigations:—

S. A. Green, Brisbane;
W. D. Lewis, Brisbane;
R. Pritchard, Brisbane;
R. E. Brown, Brisbane;
P. Mitchell, junr., Currumbin;
C. C. Parkinson, Coorparoo;
E. L. Miles, Zillmere;
R. D. B. May, Kureelpa, Nambour;
A. Chappel, Wamuran; and
E. R. Nichols, Cambroon, via Brooloo.

These appointments are for a period not exceeding three months as from the date of commencing duty.

Messrs. L. J. W. Taylor and J. King, of Brisbane, have been appointed Inspectors on probation, Agricultural Bank.

Mr. R. F. Hobler, of Moyen, has been appointed a Member of the Windorah Dingo Board, vice Mr. N. P. Saywell, resigned.

Mr. M. R. Muller, of Hamilton, has been appointed Temporary Inspector of Stock.

Misses G. E. Dingle, C. Humphries, and A. S. Mullin have been appointed Assistant Cane Testers at Marian, Millaquin, and Moreton Mills, respectively.

The District Inspector of Stock, Rockhampton, has been appointed Government Representative on the Gogango Dingo Board, vice the Police Magistrate, Rockhampton, resigned.

The appointment of Mr. G. R. I. Anderson as Inspector of Slaughter-houses has been confirmed, as from the 5th December, 1927.

The Officer in Charge of Police, Mungindi, has been appointed Inspector of Brands.

Mr. C. L. Moran, Inspector under the Dairy Produce Act, Rockhampton, has been appointed Dairy Instructor, Department of Agriculture and Stock.

Constables J. A. Holley (Bollon) and C. J. Nugent (Injune) have been appointed Inspectors of Brands.

Mr. T. R. Kennedy, Police Magistrate, Bowen, has been appointed Chairman of the Inkerman, Kalamia, Pioneer, and Invicta Local Sugar Cane Prices Boards for the 1928 season, vice Mr. R. A. Tait, resigned.

**The Wheat Pool.**

Mr. W. Forgan Smith, Secretary for Agriculture and Stock, has announced that on the 28th of April last a Proclamation was issued extending the Wheat Pool Acts so that they would apply to all wheat harvested during the seasons 1928-29 to 1932-33, with the stipulation that if 500 growers of wheat who delivered wheat during the seasons 1926-27 and 1927-28 petitioned before the 1st June, 1928, for a referendum as to whether or not a poll was to be taken, and if upon such poll the majority of votes recorded was against the extension, the Proclamation would not take effect. The complement of 500 growers represents about 10 per cent. of the total number engaged in the growing of wheat. However, no such petition was received, and the Wheat Pool will accordingly continue to function until 1932-33.

Prior to the issue of the Proclamation in April last, petitions from various sources were received, asking for an extension of the pool, and these were signed by 400 wheatgrowers. There was also a petition received towards the end of last year, asking for a referendum before the pool was extended. This was signed by ninety-seven growers (this number of growers would be less than ½ per cent. of the total number of farmers engaged in the growing of wheat in this State), and, of course, no action was taken on this petition in respect to a ballot, as the conditions of the Proclamation issued on the 28th April last had not been fulfilled.

The ballot of growers which was taken in the year 1924 resulted in over 88 per cent. of the votes recorded being in favour of the continuance of the pool, and the cost incurred in the conducting of a ballot (which has to be borne by the growers) is sufficient reason to dispose of a further ballot being taken, unless there is adequate evidence to indicate that the majority of the growers do not favour the continuance of the pool. No tangible evidence of this nature was forthcoming in connection with the opportunity recently afforded to secure a ballot being taken, and consequently the pool has been extended without a further ballot of the growers being taken on the matter.

**Stock Losses at Quilpie.**

With reference to certain losses of stock at Quilpie, regarding which it was suggested the animals showed symptoms of poisoning, the Minister for Agriculture and Stock (Mr. W. Forgan Smith) instructed the Government Botanist (Mr. C. T. White) and Mr. E. J. Tannock, the Inspector of Stock at Charleville, to make urgent investigations.

A report has now been received from these officers that the trucking reserve and main stock route for some distance back from the reserve were inspected for the presence of plants likely to cause losses in stock.

On inquiry it was learnt that although there were only a few instances where losses were reported, the number of fatal cases in each instance was very large. In the latest case reported it was learnt that the cattle arrived on the reserve in very poor condition, and a considerable number were found dead on the following morning. This pointed either to hoven, due to eating succulent herbage, or to having eaten some plant containing a cyanogenetic glucoside. The latter theory was favoured.

The main stock route for about 28 miles from Quilpie was traversed, but was practically devoid of herbage and grass, and nothing could be found in sufficient quantity to cause trouble.

A number of poisonous or suspected plants were found on the trucking reserve, amongst others being the Bottle Tree Caustic, Caustic Creeper, and the Ellangowan Poison Bush. Along the stock route in wooded places, such as low hillsides, there is a quantity of Climbing Caustic, but there is some doubt about the properties of this plant, which, however, was not in sufficient quantity to cause trouble.

A number of plant specimens was obtained and handed to the Agricultural Chemist (Mr. J. C. Brünnich) to test for prussic acid yielding glucosides. This examination revealed that of the plants from the Quilpie Reserve, only the Fuchsia Bush gave a strong positive test, and this bush, if eaten, would certainly be likely to cause the trouble. The poisonous principle in this plant varies from time to time, and occasionally the plant is almost free from it. The young succulent-growing parts seem to be the most active.

Of the plants collected on the stock route, the Western Rosewood gave a fairly strong positive test, but this tree is hardly in sufficient quantity to have a great effect.

The report of the officers indicates that there is no great danger to be apprehended, provided cattle are carefully driven and are in reasonable condition. Since the last loss several mobs of cattle have occupied the reserve and practically no losses among them have occurred.

**Peanut Board Election.**

Nominations for the election of four members to the Peanut Board closed at the Department of Agriculture and Stock on the 24th instant, with the following results:—

District No. 1 (Wienholt and Nanango Districts)—
Charles Frederick Adermann, Wooroolin, and
Malcolm Redman, Crawford.
(Two representatives required.)

District No. 2 (the Central District)—
Alfred Skinner Clark, Sandhills.

District No. 3 (the rest of Queensland)—
Albert Charles Perske, Degilbo.

As only the required number have been nominated no election will be necessary, and steps will be taken for the appointment of the new members as from the 1st September next.

**Lowering Production Costs.**

The great problem facing the man on the land to-day is that of increasing his profits by lowering his production costs, for it is not likely that selling prices will show much increase or decrease. He cannot possibly consider increase of labour in order to increase production, for wages are payable all the time and profits come only at marketing time, and then depend almost wholly as to whether or not the weather has been kind. The only possible way then to reduce production costs is to find better methods of doing the work, and the use of modern machinery, with the addition of power where necessary, is the only way out of the problem. The Oliver Chilled Plough Works are pioneers in the manufacture of tillage equipment for tractor power builders. Oliver ploughs, harrows, cultivators and cane tools, all built for special use with the Fordson Power Unit, are admittedly among the most modern farm and station equipment obtainable. Among the Oliver lines are Oliver double side disc stump jump ploughs (with or without stump jump equipment); 1, 2, 3, and 4 furrow drawn type disc ploughs; 1, 2, 3, and 4 furrow mould-board ploughs; disc harrows; spring tooth harrows; tune harrows; cultivators; and a complete line of horse-drawn ploughs, as well as everything required by the cane farmer in the way of implements. The Queensland distributors are Brisbane Cars and Tractors Limited, whilst the Townsville distributors are Northern Cars and Tractors Limited, Flinders street.

**Wheat Board Nominations.**

The following nominations have been received in connection with the annual election of five members to the State Wheat Board:—

District No. 1 (Dalby-Maranoa)—
Hoskin, Aaron, Mount View, via Jimbour;
Swan, Robert, Wallumbilla.

District No. 2 (Pittsworth District)—
Fitzgerald, Edward, Felton;
Krieg, Arthur Carl, Brookstead.

District No. 3 (Warwick and Killarney)—
Booth, Joseph James, Junabee;
Braithwaite, Thomas, Warwick.
Kirkegaard, Bergittinus Clemen Christian, Freestone.

District No. 4 (Allora-Clifton)—
Neale, William John Thomas, Allora.

District No. 5 (Toowoomba and Lockyer)—
Archibald, John, Oakey;
Garvey, William, Gowrie Little Plain;
McNee, Patrick, Kingsthorpe.

The election will be by postal ballot, and the counting of votes has been fixed for the 31st August.

**Engines Reduced in Price.**

It will be good news to every man on the land to know that the Ruston-Hornsby petrol-kerosene engines have been greatly reduced in price. Seldom has such a quality engine been offered for such low cost. The prices of these engines are advertised elsewhere.

**Fruit Marketing—Sectional Group Committees.**

Regulation 12 under the Fruit Marketing Acts has been revoked, and a further Regulation 12 issued providing for the nomination of candidates for election to Sectional Group Committees. In the case of the Banana Sectional Group Committee, a candidate for election must sign a statutory declaration to the effect that he does not act for or receive money from any agent or fruit merchant other than moneys received in payment for fruit consigned for sale and grown by such candidate.

**Spider Bites—a C.W.A. Member's Homely Remedy.**

Through the Country Women's Association we have received the following contribution from Mrs. Bertha E. Phelps, president of the C.W.A. branch at Mungindi, concerning a remedy which she says she has never known to fail, and which has been used by her for over thirty years:—For bites by spiders, centipedes, scorpions, and other poisonous insects, make a hot bread poultice and then sprinkle thickly with good ipecacuanha powder. Apply this to the wound and repeat every hour if necessary. If treated at once, one poultice may suffice. I always give a small dose of Epsom salts to help to get rid of the poison out of the blood. I buy fresh ipecacuanha powder every year or so in order to have it strong.—"The Farmer and Settler."

**Shall We all Fly?—Australia has most Privately-Owned Aeroplanes.**

A vision of the day when every farm will have its own aeroplane landing-stage arises out of the latest figures of the Moth aeroplane output to countries throughout the world.

Australians own the largest number (34) of the 185 of these little machines delivered in twelve months. Thirty of them belong to private individuals in England.

All the Moths have folding wings; they can be wheeled and manœuvred by one man and housed in an ordinary garage. They can, moreover, descend on very limited space, while the cushioning effect of the Dunlop balloon tyres makes a smooth landing practicable almost anywhere.

The machines have a cruising speed of 75 to 80 miles an hour, and the remarkably small petrol consumption of 20 miles to the gallon. They can climb, at the rate of 625 feet per minute, to a height of 15,000 feet.

**Herd Testing—A Misunderstanding Removed.**

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, announced recently that representatives of the dairying industry had waited upon him and mentioned that it was understood that, from Press references to the effect that the Queensland Government had decided not to accept subsidy from the Commonwealth Government in connection with herd testing, and that it was the intention of the State Government to either discontinue or curtail herd testing operations.

The Minister advises that it is his desire to correct the erroneous impression which had arisen in the minds of dairy farmers, and he wishes to state definitely that herd testing operations will be continued, and every endeavour made to encourage dairy farmers to submit the highest possible number of cows to the test.

In the Dairy Bulletin, No. 2, which is published in this issue, a special appeal is made to dairy farmers to submit their herds for testing, and to take advantage of the facilities afforded by the Queensland Government to assist them in the important matter of increasing their milk and butter fat production. No legitimate application for the services of a herd tester to carry out the testing of any herd will meet with the refusal of the Department.

The Minister added that the subsidy from the Federal Government had applied only to two years' herd testing operation, and in this period £566 had been received from the Commonwealth Government by way of subsidy, and in the course of this period the expenditure in herd testing incurred by the State was slightly more than £4,400. It will be seen, therefore, that the Commonwealth contribution was small in comparison with the expenditure borne by the State, and in addition to this expenditure it must be recognised that the Better Bull Subsidy Scheme increases the monetary contributions that are made from State funds for herd improvement.

### A Mackay Sanctuary.

Camping Reserve No. 116, Cattle Creek, Mackay, has been declared a Sanctuary under the Animals and Birds Acts.

### A Versatile Citrus Tree.

About four years ago Mr. A. Woods, of Lorraine, Wilston, Brisbane, obtained a lemon tree from Coominya. The tree was immediately planted and first fruited in 1927. This year it fruited again with one half of the tree laden with Lisbon lemons and the other half with mandarins. Both classes of fruit were sound and well developed. The foliage in each case is true to type.

A paddock full of trees like that would, no doubt, solve many citrus grower's marketing worries.

### Success of Queensland Dairy Factories.

The Minister for Agriculture and Stock (Mr. W. Forgan Smith) informed the Press recently that it was pleasing to note the continued success of the Queensland dairy factories in dairy produce competitions. At the competitions held in Sydney in June it was noted that the Logan and Albert Co-operative Company and the Warwick Co-operative Dairy Company were successful in securing third position, while in the cheese section both awards went to Queensland, the Downs Co-operative Dairy Company at Lilydale and Koondaii being first and second respectively. It was gratifying, he said, to find that the products of this State were of such a high standard, and he congratulated the factory managements on their successes.

### Gassing Tons of Mice.

Recently, under the supervision of the manager of the State Wheat Board (Mr. W. Binns), poison gas was used to destroy the mice in the remaining portion of the wheat dump at Allora. The operation was most successful. After the gassing nineteen kerosene tins full of dead mice were gathered up, the number of rodents killed being estimated at 21,000. Not a mouse escaped from the dump, which is now almost removed, and the gassing operation must have prevented an intolerable plague in neighbouring houses that would have been caused by the mice from the demolished dump seeking further shelter. At the Clifton dump it is reported that a ton and a-quarter of mice had been destroyed in one day's gassing.

### A Noxious Plant.

The Minister for Agriculture and Stock (Mr. W. Forgan Smith) has informed us that, as a result of losses in stock that had occurred on a property at Zillmere, arrangements had been made for Mr. Francis, an officer attached to the Botanical Branch, to visit the property on which the losses of stock had occurred, and he reported that the probable cause of the trouble was the shrub *Cestrum Parqui*, a native of South America, but common as a stray from garden culture and in some places more or less of a weed. There seems to be no common name given to the plant, but it can be told by its brownish-green or yellowish-green flowers borne in bunches which are followed by black berries. Suburban poultry and dairy farmers who may have the plant growing in their properties are advised to destroy it.

### Queensland Products—Appreciation of Southern Visitor.

With the object of securing first-hand information of the conditions prevailing in this State, Mr. T. H. Arrowsmith (general manager in Australia of the H. J. Heinz Company) has made a thorough investigation of Queensland. Confessing his amazement at the marked development of the country, in the course of an interview, Mr. Arrowsmith said that Queensland was very fortunate in its possibilities, and the greatest success attained by any country was where there were outstanding possibilities for primary production, principally foodstuffs. Another advantage which Queensland possessed was in natural outlets to the sea at frequent intervals, and natural geographical centres for handling raw products. The type of men and women in Queensland were of the best Anglo-Saxon—of fine physique and keen intelligence, and they took a marked interest in what was going on around them.

Referring to foodstuffs, Mr. Arrowsmith said that the Spanish white variety of peanut was the best nut for manufacturing purposes, on account of the oil content and other values. From what he had seen of the tomatoes grown in the district, they were more of the home-grown variety and not the large heart-shape type, which was the best kind for food. The quality of land on the coast and the class of climate was certainly invaluable for growing almost any kind of food.

**Committee of Direction of Fruit Marketing.**

The Regulations dealing with the election of Sectional Group Committees under "*The Fruit Marketing Organisation Acts, 1923 to 1925,*" have been revoked, and new Regulations 73, 74, 75, 76, and 77 have been approved under those Acts, providing for the election of Banana, Pineapple, Citrus, Deciduous, and Other Fruits Sectional Group Committees.

**Age and Youth.**

"Always, as long as I can remember, there has been a dispute and invidious comparisons between the old and the young. The young find the old prey upon and restrain them, and the old find the young shallow, disappointing, and aimless in vivid contrast to their own revised memories of their own early days. The present time is one in which these perennial accusations flower with exceptional vigour. But there does seem to be some truth in the statement that the facilities to live frivolously are greater now than they have ever been for old and young folk alike. In the great communities that emerge from Christendom there is a widespread disposition to regard Sunday as merely a holiday. But that was certainly not the original intention of Sunday. It was a day dedicated to the greater issues of life. Now great multitudes of people do not even pretend to set aside any time at all to the greater issues of life. The churches are neglected, and nothing of a unifying or exalting sort takes their place."—H. G. Wells.

**The Public Curator's Office.**

Time—a period of twelve years—has proved the belief of the people of Queensland that the Public Curator Office, created for their needs, has more than justified its existence.

The profits earned by the Office since its inception on the 1st January, 1916, have been such that the costs and charges of administration have been reduced from time to time, making it now the most liberal Public Trust Office in Australia.

Not only have the costs and charges been reduced to a minimum, but the shares held on behalf of infant beneficiaries until they attain their majority are increased by the addition of interest at the rate of 5 per cent. per annum. This is a gilt-edged investment for infants, because the Office of the Public Curator is under the guarantee of the State, and when a child attains twenty-one years of age its share, with compound interest added, is payable immediately. There is no question of misappropriation which often happens when private persons are appointed Executor and Trustee.

Furthermore, the Public Curator Act provides for the maintenance and education of children out of their shares without the necessity of making an expensive application to the court for leave to do so. This matter is in the discretion of the Public Curator, who is at present helping hundreds of parents to maintain their children out of the shares to which they are entitled in the estate of a father, mother, or other relative.

In order to make manifest, in a practical way, their confidence in the Trust Office of the Public Curator, over 20,000 persons have made their wills appointing the Public Curator their Executor and Trustee. As Dave would say, "He's awright." Why? Because the Public Curator acts without fear or favour. He is under no obligation to friends, relatives, or political parties, but carries out his duties fearlessly and impartially as the law provides that he should, and he charges only what fees and costs that the law has fixed, neither more nor less.

As the Office of the Public Curator is a corporation, it never dies. This means that men may come, and men may go, but the Public Curator as Executor and Trustee still goes on, thereby assuring continuity of administration which is a very important matter.

Moreover, the Office is so organised as to ensure promptitude with efficiency and safety in the despatch of business throughout Queensland. The policy of the Office provides for the widest possible measure of decentralisation consistent with safety. Necessarily, the most important administrative work has to be centred in the Head Office at Brisbane; but the Branch Offices at Rockhampton, Townsville, and Cairns are as self-contained as possible, thus facilitating the work throughout this great State and saving time. These Branch or District Offices have full power to conduct the administration of estates in their respective districts, and are in charge of reliable and responsible officers with efficient staffs skilled in all phases of estate administration.

### Castor Oil Plant Leaves.

How many people in the country know that the castor oil plant leaf makes one of the best poultices in the world? The Indians in South America use it as a sovereign remedy for tumours, boils, and abscesses. Steeped in tepid water with a few drops of lysol, the leaves are said to be a sure cure. It is good also to relieve pain in the stomach. When the writer was in Queensland some years ago on a visit to a station, the manager was found lying in agony with abdominal pains, patiently awaiting the arrival of the doctor. Knowing of this remedy the writer made a large poultice and applied it, with almost immediate relief. The leaves are used largely in treating wounds in horses in South America.—"The Pastoral Review."

### Co-operation—What it Means.

The London Co-operative Society has issued another edition of the useful pamphlet by Mr. R. C. Morrison, M.P., entitled "The Commonsense of Co-operation." This edition has a "foreword," written by Mr. Ramsay MacDonald, who says—

"Every worker should belong to the Co-operative Movement. Mr. Morrison shows that co-operation is the movement by which the workers do without the middleman and supply for themselves goods that are honest, whilst keeping in their own pockets profits that would otherwise go to make other people rich. Mr. Morrison's arguments are forceful and convincing, and the pamphlet merits a big circulation."

### What Dairying means to Australia.

Here are some illuminating Federal figures, compiled officially:—

Dairy farms represent a capital of £125,000,000.
Annual production, £45,000,000, of which £30,000,000 is for milk products.
Capital outlay of dairy factories, £4,250,000.
Dairy factory production, £23,000,000 per annum.
Two thirds of the production is consumed locally, and one-third exported.
On dairy farms 143,785 people are employed.
In dairy factories 5,826 people are employed.
The dependents of those employed in the dairying industry number 500,000.
Directly and indirectly, at least 1,000,000 people in Australia, or one-sixth of our total population, are dependent upon the dairying industry.

### Mammitis.

The Minister for Agriculture and Stock (Mr. W. Forgan Smith) has announced that numerous inquiries had been received by the Department from dairy farmers relative to the efficacy of vaccine as a preventive or curative agent for infectious mammitis. He had referred the inquiries upon this matter to the Chief Veterinary Officer of the Department, Major A. H. Cory, M.R.C.V.S., and he has submitted the following informative particulars concerning this disease:—

For several years past it has been recognised that the best treatment for this disease is the use of a vaccine. The vaccine usually contains two organisms—viz., Staphyococci and Streptococci, two common pus organisms, but the vaccine is made from various strains of these organisms. A vaccine is prepared and kept in stock at the Stock Experiment Station, Yeerongpilly, as also are other proprietary stock vaccines on the market. It appears useless to inoculate against this disease until animals are affected. The use of the vaccine in our present stage of knowledge, appears more as a curative than a preventive, and even then the ordinary stock vaccine in many cases is useless, an autogenous vaccine (one prepared from the individual animal) being necessary to bring about the desired result.

Proprietary vaccines on the market have been bacteriologically examined by this Department, and found to be sterile preparations, consequently they can do no harm, and the operation is so simple that any person of ordinary intelligence can carry it out. Thousands of dairy herds will never be affected with this disease, consequently vaccination is useless. If they should be treated the vaccine will be wrongly credited as being a preventive.

Inquiries have been made from other countries and the various States of the Commonwealth, but it is not recognised that the stock vaccines on the market are of any scientific value as preventives.

One Australian journal sums up the use of proprietary preparations as follows:—"In the meantime farmers will be well advised to exercise great caution in accepting interested statements and spending money on the vaccination of their cows. There is great risk in resting under a false sense of security, and thereby neglecting ordinary preventive measures."

**Great Ideals.**

"The great ideals of the old world indissolubly linked with the primitive record of Christianity, are preserved for us in letters of gold, in language that escapes all change; they stand behind and beyond our local habits, and our local forms of creed. To them all the peoples of the civilised world look back; and by them the nations of the future may be inspired and brought nearer to each other. Let us not think lightly, then, of the old high road which the course of European education still leaves open before every new age. Let us see to it that our successors may have the privilege that has been given to us, of hearing the great voices of that older time speak in their own accents across the silent years, of being quickened by them to know the gold from the dross, of learning from them what is simple, what is high, what is human, what is true.

"'Captains and conquerors leave a little dust,
And kings a dubious legend of their reign;
The swords of Cæsar, they are less than rust:
The poet doth remain.'"

—Professor Conway.

**Glass-Lined Tanks for Milk Carriage.**

Anything that can be done to minimise the handling of milk is welcomed. Progress is being made in this direction in England, and it is now announced that by means of the new glass-lined tanks for rail transportation introduced by Wilts United Dairies, in conjunction with the London, Midland, and Southern and the Great Western Railways, milk will be brought from the creamery in Wiltshire to the combine's depôt in London without it once being seen, let alone touched, until it is safely bottled, at the rate of 21,000 an hour, after pasteurisation.

The railways have introduced special facilities in the past for dealing with the milk traffic. "Milk only" trains are run, and sidings, vans, and docks have been built. Now the tanks have arrived.

These tanks are constructed of steel and lined throughout with glass enamel, which is unaffected by the action of milk, and harmless to the milk itself. Glass is the easiest material in the world to keep clean and sterile.

The service marks the greatest advance in the rail transport of milk ever introduced into the country. Over 280,000,000 gallons of milk are conveyed annually by British railways, and a train 2,333 miles long would be required to haul this amount under the churn system. Where the tanks are used, churns are entirely done away with, and the train in this case would measure only 689 miles, a saving of 70 per cent. A like percentage is saved in dead-weight haulage. On three vanloads of churns this is 80 tons, and on one tank, which conveys the same quantity of milk, 22 tons. One tank holding 3,000 gallons of milk has a much smaller bulk than 300 churns, each holding ten gallons.

Not the least important factor about the tank method is the cool and even temperature at which it is possible to transport milk. This is maintained with never more than an increase of one degree on the hottest day by means of cork and steel insulation at 38 degrees, at which temperature bacterial growth is impossible. The insulation consists of a 2-inch thickness of cork, protected by thin steel.

On arrival at Willesden the milk is unloaded from the tanks at the rate of 150 gallons a minute. This is accomplished by means of compressed air, all of which is filtered.

Special attention has been given to the design of the fittings on the tanks, so that they may be easily dismantled for sterilisation. With the old method, every churn and its lid were thoroughly washed and sterilised at the end of every journey, and this involved loss of time, labour, and expense. The tanks can be simply and thoroughly cleaned by one man. The fittings include, beside one milk inlet and two milk outlets, a stream or air inlet and a manhole to facilitate inspection.

The first cleansing process consists of rinsing with cold water, after which the glass surface of the tanks is thoroughly scrubbed. This is where the man clambers in. Rinsing with hot water follows, and finally comes sterilisation with steam at a pressure of 30 lb. to the square inch. Should the pressure exceed that figure there is a safety valve.

As with the churns, cleansing and sterilisation are done at the end of every journey.

# The Home and the Garden.

## OUR BABIES.

*(From Notes issued by the Queensland Baby Clinics.)*

Under this heading it is proposed to issue a series of short articles dealing with the welfare and care of babies, in the hope of increasing their health and happiness and decreasing the number of unnecessary deaths among them.

### Four Important Points.

When a mother thinks of weaning her baby there are four points which she should take into consideration—

(1) The age of the child;
(2) The time of the year;
(3) The time required for weaning;
(4) The method of doing it.

### The Age of the Child.

The best time to wean baby is between the age of nine and twelve months. Up to that time his sole food should have been his mother's milk and, unless for urgent reasons, baby should never be weaned before that. The younger the baby is the greater are the risks that attend the process. Thus, a baby four or five months old is much more likely to become upset or ill if weaned than one eight or nine months. If baby is less than nine months old when weaned, he should be given a feeding bottle, but if over that age it is better to teach him to drink out of a cup or to use a spoon. If baby has been bottle-fed, when weaning time comes give him his food out of a cup instead of the bottle at first for one feed only during the day, so accustoming him to the change. Then later give the cup for two feeds and the bottle for the remainder of the day, and so on.

Some mothers think that if they give a bottle feed instead of a breast feed in baby's early months, they will, in this way, make weaning easier. This should not be done. What they almost always achieve is the unnecessary early weaning of the child, for by substituting a bottle feed for a breast feed the mother's milk will diminish. Drinks of boiled water may be given to a young baby from a bottle, but a full feed should not be given while baby is on the breast.

The second point is the time of year. Always, if possible, avoid weaning in very hot weather. This is sometimes difficult, because Queensland has a long summer. If baby must be weaned during hot weather avoid the worst months. Here the worst months are probably not the hottest, but those during which dysentery or summer diarrhœa (gastro-enteritis, as it is often called) is prevalent. Every summer this disease appears and makes many babies ill. It appears early in summer and is at its worst in November and December. For this reason these are the most dangerous months for weaning baby. If he reaches nine months during this time, postpone weaning at least until January, and then go very slowly and carefully.

Babies kept wholly on the breast until about fifteen or sixteen months old—i.e., until the cooler weather comes, are often very difficult to wean. Not infrequently they refuse absolutely to take other foods. The older the baby the more difficult he is to wean.

The third point is the time required for weaning. Unless absolutely unavoidable the change from natural to artificial feeding should never be sudden. The mother who quite suddenly substitutes the one for the other doubtless does it with good intention, but it is an unkindness to the baby. The change from complete natural feeding to complete artificial feeding should never be made in less than two weeks: preferably take five or six weeks.

### A Practical Plan.

The following is a practical plan for weaning after nine months. We will assume that the baby has been fed four-hourly—i.e., at 6 and 10 a.m., and 2, 6, and 10 p.m., so getting five feeds daily.

First Change.—Give baby oat or barley jelly by spoon at the 10 o'clock feed. Begin with 1 tablespoon of the jelly and give 2 or 3 teaspoons of cow's milk on it. Follow this by the usual breast feed and give breast feeds as usual for the remainder of the day. Do this daily for a week and make no other change during that time.

A crisp crust may be given once or twice daily before feeds throughout the weaning period. Give it to him when he is hungry. About ten minutes before his feed is due, not between feeds.

Second Change.—Omit breast feeding at 10 a.m. Give instead first the oat or barley jelly, which may be gradually increased to 2 or 3 tablespoons, and follow this by about 6 to 8 oz.—about an ordinary cupful—of milk mixture. Make no further change during this second week. Pure milk should not be given to begin with; it is better to commence with about 3 parts milk to 1 of water and gradually increase to full strength.

Third Change.—Give the breast every eight hours—i.e., at 6 a.m., 2 p.m., and 10 p.m. Give oat or barley jelly at 10 a.m. and 6 p.m., followed by the milk, as in change 2. Do this daily and make no further change this third week.

Fourth Change and for the Fourth Week.—Give the breast at 6 in the morning and 6 at night. At the other three feeds give the milk mixture. Give oat or barley jelly at 10 a.m. before bottle, and at 6 p.m. before breast.

Fifth Change and for the Fifth Week.—Give the breast once only—i.e., at the 6 a.m. feed. Give milk mixture for all other feeds. Oat or barley jelly before 10 a.m. and 6 p.m. feeds.

Sixth Change and for the Sixth Week.—Discontinue giving breast at 6 a.m. Give milk only.

Baby is now entirely weaned, and it is probable that it has been achieved without his realising that any change was being made.

**When Life Habits are Formed.**

After weaning is completed, care is still required to establish the baby on suitable food. He should certainly not be allowed to share the family meals, and eat scraps of everything. Remember that at this stage food tastes and habits are formed which may last a lifetime. The following important points should be remembered by the mother:—

1. Teach baby to drink out of a cup at any time between nine and twelve months (if this has not already been done, and provided he has cut two teeth) and discontinue bottle feeding. Give the drinks from a cup, first at one feed (say, the 10 a.m.) then at two feeds in the day, and so on, thus discontinuing bottle feeding gradually.

2. Keep absolutely to regular meal times. Give nothing whatever but water and fruit juice between meals.

3. As baby takes more solid and varied food he needs less milk, but do not let him go without a drink at each meal. A healthy baby at this age can usually take pure cow's milk. Up to eighteen months milk in some form should be his principal food.

4. Introduce all new foods one at a time and a little at a time. Never make sudden changes. It is better to go too slowly than too quickly.

5. Teach baby to eat each new food that is good for him. Do not let him start the bad habit of refusing food because he does not like it. If persevered with, babies like almost anything that is good for them. They will not want the things which are bad for them if they have never tasted them. Do not let them get the taste for cake or sweets.

6. Active exercise for teeth, jaws, and salivary glands is absolutely necessary. Baby must be taught to chew, not to bolt his food, and, as times goes on, to take more and more of his food in hard form. Remember that toast or crusts, with butter or dripping and a drink of milk are just as nourishing and better for teeth and digestion than a basin of bread and milk.

7. Do not add too much sugar to baby's food. It is bad for the teeth and the digestion.

8. Cook all foods thoroughly and serve appetisingly. Add a little salt in cooking.

9. Children should not be continually urged to eat if they are disinclined to do so. Under no ordinary circumstances should a child be forced to eat.

10. If there is any important article of a simple diet, such as milk, meat, cereals, or vegetables, which a child habitually refuses, this should always be given first at the meal, and all other food withheld until this is eaten.

11. Always give the most substantial meal in the middle of the day. Never give a young child a meal of meat and vegetables before he goes to bed at night.

**Suitable Foods.**

The following foods may be given to baby between the the end of weaning and twelve months:—More cereal jelly, slowly increasing up to 10 oz. daily. More crisp crust and toast; more fruit juice.

From twelve to fifteen months a considerable increase may be made in the diet, always remembering to give new foods one at a time and a little at a time.

Give more solid, dry, and hard foods, such as crusts, baked bread, and toast, all to be taken with a little butter or dripping. Sweet biscuits should not be given. They are made from finely ground flour, which form a paste which lodges in the crevices of the teeth, where it is liable to set up fermentation and decay. Cereal jellies to be continued; towards the end of the time gradually mix some unstrained porridge into the jelly, and as time goes on less and less need be strained. Give milk puddings made with well cooked ground rice or semolina. At this time a little egg may be given—perhaps half a yolk two or three times a week. Gradually introduce a little white. Give vegetable milk-broth, chicken broth, or mutton broth; all to be made with pearl barley or rice and to be well strained.

Of Vegetables.—Floury potato cooked in skin, spinach, cauliflower, carrot, &c., well cooked, rubbed through a fine sieve and served warm with a little butter or meat gravy without fat.

Fruits.—Pulp of baked apple or pulp of stewed prunes. Begin with only a teaspoonful and increase very gradually to 1 or 2 tablespoons. A little milk may be given with this. Gradually and cautiously some raw ripe apple may be given.

From fifteen to eighteen months, feed on same lines as for previous three months, but give more solid, hard foods, including wholemeal bread and milk puddings made with rice, sago, &c. Give a piece of raw ripe apple at the end of each meal. Continue training baby to chew thoroughly and avoid giving much soft, mushy food. An egg lightly boiled may be given, but not more than three times a week. Light fish, steamed or boiled, may be given; also chicken, steamed or boiled and either well minced or preferably chewed off the bone. Only a teaspoonful of either fish or chicken should be allowed at first, and the quantity very slowly increased.

An important point for the mother to remember during this period is that, though baby's first teeth are only now being cut, the second set of permanent teeth are forming in the gums. Their strength and durability depend very largely on the foods given and the amount of work done by mouth and jaws at this time.

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## THE WOMAN ON THE FARM.

By A. H.*

When considering the amount that is written on labour-saving devices and the home life on a farm generally, one wonders why the farm home is still in such a primitive state.

There is no doubt that the farmer's wife is a very conservative being. She will read about wonderful labour savers, and occasionally go to meetings and hear discussions on improving the home, but she will go steadily on in her old way. I wonder how many women owe their ill-health to the washtub.

**Wash Day in Winter.**

Consider a farm woman's wash day in the winter. After the usual work of getting breakfast, washing dishes, getting the children off to school, tidying up the house, &c., she will start her washing.

She will turn a washing machine for an hour or more, put the wet clothes through a wringer which also has to be turned by hand, change the water for rinsing, put the clothes through the wringer again, then carry a heavy basket of wet clothes outside and put them on the line, though she knows they won't dry, only freeze. It will improve the colour of the clothes, so she struggles with frozen sheets and pegs that slip out of her hands because they are so cold.

Surely that is enough work for one little woman; but no, her day is barely started. The washing machine has to be emptied and put away, the floor washed and the place tidied up, dinner to get and wash up, then the clothes have to be brought in and hung up somewhere where they will dry.

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* In the "Western Producer" (W.A.).

### Farm Woman is Conservative.

There is a saying that work never kills one, if it did the farm woman would very soon be extinct. Let anyone suggest to the farm woman that she send her washing to the laundry, she will immediately give many reasons why she could not do that. "They make the clothes such a bad colour," or "they tear the clothes so." Surely her health and looks are more important than sheets and towels.

I think the farm papers could help more than they do. Pick up any farm paper and open at the woman's page. What does it chiefly write about? "How to can vegetables," "How to put down meat," "How to make rag mats in one's spare time." How to make innumerable things which mean never ending work. I would like to see a page given over occasionally to telling farm women how to sit and do nothing.

### Pleasure is Great Part Work.

Even her pleasures are a great part work. If it is a community affair she generally has to take some cooking with her; if it is a private visit, she will probably enjoy a very good meal, and then spend most of the rest of her visit in helping wash the dishes.

A farm home life can be a very happy cosy affair, but very often it is just the opposite, and the blame is greatly due to the woman. There is too much of the idea that because one is on a farm everything must be made on the farm, and the labour-savers of the city are not used enough.

### Learn to Live.

I would like to impress upon the farm woman not to look askance at the woman who sends her washing to the laundry, who sometimes buys bread, and who, instead of spending lovely summer days over a hot stove canning fruit and vegetables, buys the stuff from the store, and goes out and enjoys the fresh air and sunshine, and feels and is a better woman for it.

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## KITCHEN GARDEN.

Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Manure for the garden during summer should be in the liquid form for preference. Failing a sufficient supply of this, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly-dug beds. What the action of salt is is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada beans, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts peas and even some beetroot may be sown. Set out egg plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinnach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

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## FIVE REASONS IN FAVOUR OF THE HOME VEGETABLE GARDEN.

(1) Fresh vegetables, especially vegetables containing vitamines, are essential to good, robust health, and medical men are now advising people to "eat more vegetables."

(2) The growing of vegetables not only means a saving of money, but educates the children by inculcating a desire to have their own gardens in later life, and so help to keep down the costs of living.

(3) Vegetable-growing is not only a healthy occupation, but it also provides exercise and recreation. In the suburbs it has a tendency to keep young people contented at home, and to trouble less about going to horse races and places of gambling. With country people who, perhaps, are less in need of exercise, gardening is a delightful hobby.

(4) It enables private gardeners to improve the strains of vegetables by a careful selection of seed, much in the same way that a flockmaster improves his sheep; and much satisfaction, and not unusually generous reward are to be gained from this work.

(5) The home garden enables the testing out, in a small way, of the newer varieties of vegetables, which work is not always possible, or, if it is possible, not payable with the professional or commercial gardener. The amateur gardener will find this work both fascinating and health-giving.

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# Farm Notes for September.

With the advent of spring, cultivating implements play an important part in farming operations.

The increased warmth of soil and atmosphere is conducive to the growth of weeds of all kinds, particularly on those soils that have only received an indifferent preparation.

Potatoes planted during last month will have made their appearance above the soil, and where doubt exists as to their freedom from blight they should be sprayed with either Burgundy or Bordeaux mixture as soon as the young leaves are clear of the soil surface.

Land which has received careful initial cultivation and has a sufficiency of sub-surface moisture to permit of a satisfactory germination of seeds may be sown with maize, millets, panicum, sorghums, melons, pumpkins, cowpeas, broom millets, and crops of a like nature provided, of course, that the areas sown are not usually subjected to late frosts.

Rhodes grass may be sown now over well-prepared surfaces of recently cleared forest lands or where early scrub burns have been obtained, and the seed is sown subsequent to showers. More rapid growths, however, are usually obtainable on areas dealt with, say, a month later.

In connection with the sowing of Rhodes grass, farmers are reminded that they have the Pure Seeds Act for their protection, and in Rhodes grass, perhaps more than any other grass, it is necessary that seed of good germination only should be sown. A sample forwarded to the Department of Agriculture will elicit the information free of cost as to whether it is worth sowing or not.

Where the conditions of rainfall are suited to its growth, paspalum may be sown this month.

The spring maize crop, always a risky one, requires to be sown on land which has received good initial cultivation and has reserves of soil moisture. Check-row seeding in this crop is to be recommended, permitting as it does right-angled and diagonal cultivation by horse implements, minimising the amount of weed growth, and at the same time obtaining a soil mulch that will, with the aid of light showers, assist to tide the plant over its critical period of "tasselling."

Although cotton may be sown this month, it usually stands a better chance if deferred until October. The harvesting of cotton during the normal rainy season is, if possible, to be avoided.

The sowing of intermediate crops prior to the preparation of land for lucerne sowing should be carried out in order that early and thorough cultivation can take place prior to the autumn sowing.

The following subsidiary crops may be sown during the month:—Tobacco and peanuts; plant sweet potatoes, arrowroot, sugar-cane, and cow cane (preferably the 90-stalked variety), and in those districts suited to their production yams and ginger. Plant out coffee.

# Orchard Notes for September.

## THE COASTAL DISTRICTS.

September is a busy month for the fruitgrowers in the coastal districts of this State, as the returns to be obtained from the orchards, vineyards, and plantations depend very largely on the trees, vines, and other fruits getting a good start now.

In the case of citrus orchards—especially in the southern half of the State—it is certainly the most important month in the year, as the crop of fruit to be harvested during the following autumn and winter depends not only on the trees blossoming well but, what is of much more importance, that the blossoms mature properly and set a good crop of fruit.

This can only be brought about by keeping the trees healthy and in vigorous growth, as, if the trees are not in this condition, they do not possess the necessary strength to set their fruit, even though they may blossom profusely. The maintenance of the trees in a state of vigorous growth demands—first, that there is an adequate supply of moisture in the soil for the requirements of the tree; and, secondly, that there is an adequate supply of the essential plant-foods available in the soil.

With respect to the supply of moisture in the soil, this can only be secured by deep and systematic cultivation, except in seasons of good rainfall or where there is a supply of water for irrigation. As a rule, September is a more or less dry month, and when it is dry there is little chance of securing a good crop of fruit from a neglected orchard.

If the advice that was given in the Notes for August regarding the conservation of moisture in the soil has been carried out, all that is necessary is to keep the soil stirred frequently, so as to prevent the loss of moisture by surface evaporation. If the advice has been ignored, then no time should be lost, but the soil should be brought into a state of good tilth as quickly as possible.

Where there is a supply of water available for irrigation, the trees should receive a thorough soaking if they require it. Don't wait till the trees show signs of distress, but see that they are supplied with an adequate supply of moisture during the flowering and setting periods.

It is probable that one of the chief causes why navel oranges are frequently shy bearers in the coastal districts is that the trees, though they produce a heavy crop of blossoms, are unable to set their fruit, owing to a lack of sufficient moisture in the soil at that time, as during seasons when there is a good rainfall and the trees are in vigorous growth, or where they are grown by irrigation, as a rule they bear much better crops. The importance of maintaining a good supply of moisture in the soil is thus recognised in the case of this particular variety of citrus fruit.

When the trees show the want of sufficient plant-food—a condition that is easily known by the colour of the foliage and their weakly growth—the orchard should be manured with a quick-acting, complete manure, such as a mixture of superphosphate, sulphate of ammonia, and sulphate of potash, the plant-foods which are soluble in the water contained in the soil and are thus readily taken up by the feeding roots.

Although the above has been written mainly in respect to citrus orchards, it applies equally well to those in which other fruit trees are grown. Where the land has been prepared for bananas, planting should take place during the month. If the plantation is to be made on old land, then the soil should have been deeply ploughed and subsoiled and brought into a state of perfect tilth prior to planting. It should also receive a good dressing of a complete manure, so as to provide an ample supply of available plant-food. In the case of new land, which has, as a rule, been scrub that has been recently fallen and burnt off, the first operation is to dig the holes for the suckers at about 12 ft. apart each way. Good holes should be dug, and they should be deep enough to permit the top of the bulb or corm of the sucker to be 6 in. below the surface of the ground.

Take great care in the selection of the suckers, and see that they are free from beetle borers or other diseases.

As a precaution it is advisable to cut off all old roots and to dip the corms for two hours in a solution of corrosive sublimate, made by dissolving 1 oz. of this substance in 6 gallons of water.

In old banana plantations keep the ground well worked and free from weeds and remove all superfluous suckers.

When necessary manure—using a complete fertiliser rich in potash, nitrogen, and phosphoric acid, such as a mixture of meatworks manure and sulphate of potash —1 of the former to 1 of the latter.

Pineapples can also be planted now. The ground should be thoroughly prepared —viz., brought into a state of perfect tilth to a depth of at least 1 ft., more if possible—not scratched, as frequently happens; and when the soil requires feeding, it should be manured with a complete manure, which should, however, contain no superphosphate.

Old plantations should be kept in a good state of tilth and be manured with a complete fertiliser in which the phosphoric acid is in the form of bones, basic phosphate, or finely ground phosphatic rock, but on no account as superphosphate.

The pruning of custard apples should be carried out during the month, leaving the work, however, as late in the season as possible, as it is not advisable to encourage an early growth, which often means a production of infertile flowers. If the weather conditions are favourable passion vines can also be pruned now, as if cut back hard they will make new growth that will bear an autumn crop of fruit instead of one ripening during the summer.

Grape vines will require careful attention from the time the buds start, and they should be regularly and systematically sprayed with Bordeaux mixture from then till the time the fruit is ready to colour, in order to prevent loss by downy mildew or anthracnose.

Where leaf-eating beetles, caterpillars, or other insects are present, the trees or plants on which they are feeding should be sprayed with arsenate of lead. All fruit-fly infested fruit must be gathered and destroyed and on no account be allowed to lie about on the ground, as, if the fly is allowed to breed unchecked at this time of the year, there is very little chance of keeping it in check later in the season.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Where not already completed, the winter spraying with lime-sulphur should be finished as early in the month as possible. Black aphis should be fought wherever it makes its appearance by spraying with a tobacco wash, such as black-leaf forty, as if these very destructive insects are kept well in hand the young growth of flowers, leaves, wood, and fruit will have a chance to develop. Woolly aphis should also be systematically fought wherever present, as once the trees are in leaf it is much more difficult to treat.

The working over of undesirable varieties of fruit trees can be continued. The pruning of grape vines should be done during the month, delaying the work as long as it is safe to do so, as the later the vines are pruned the less chance there is of their young growth being killed by late frosts. Keep the orchards well worked and free from weeds of all kinds, as the latter not only deplete the soil of moisture but also act as a harbour for many serious pests, such as the Rutherglen bug.

Grape vines should be swabbed with the sulphuric acid solution, mentioned in the Notes for August, when the buds begin to swell and just before they burst, as a protection against black spot and downy mildew.

New vineyards can be set out, and, in order to destroy any fungus spores that may be attached to the cuttings, it is a good plan to dip them in Bordeaux mixture before planting. The land for vines should be well and deeply worked, and the cutting should be planted with one eye only out of the ground and one eye at or near the surface of the ground.

In the warmer parts which are suitable for the growth of citrus fruits, the land must be kept well cultivated, and if the trees need irrigating they should be given a good soaking, to be followed by cultivation as soon as the land will carry a horse without packing.

In these parts fruit fly should be systematically fought, as it will probably make its appearance in late citrus fruits and loquats; and if this crop of flies is destroyed, there will be every chance of the early crops of plums, peaches, and apricots escaping without much loss.

# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

| | August, 1928. | | September, 1928. | | MOONRISE. Aug., 1928. | Sept., 1928. |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | p.m. | p.m. |
| 1 | 6.35 | 5.21 | 6.7 | 5.36 | 4.50 | 6.45 |
| 2 | 6.34 | 5.22 | 6.6 | 5.37 | 5.50 | 7.46 |
| 3 | 6.34 | 5.22 | 6.5 | 5.37 | 6.52 | 8.49 |
| 4 | 6.33 | 5.23 | 6.4 | 5.38 | 7.53 | 9.54 |
| 5 | 6.33 | 5.23 | 6.2 | 5.38 | 8.55 | 10.59 |
| | | | | | | a.m. |
| 6 | 6.32 | 5.23 | 6.1 | 5.39 | 9.55 | ... |
| 7 | 6.31 | 5.24 | 6.0 | 5.40 | 10.57 | 12.8 |
| 8 | 6.31 | 5.24 | 5.59 | 5.40 | 11.59 | 1.24 |
| 9 | 6.30 | 5.24 | 5.58 | 5.41 | ... | 2.26 |
| | | | | | a.m. | |
| 10 | 6.29 | 5.25 | 5.57 | 5.41 | 1.7 | 3.24 |
| 11 | 6.28 | 5.26 | 5.56 | 5.42 | 2.15 | 4.6 |
| 12 | 6.27 | 5.27 | 5.54 | 5.43 | 3.19 | 4.47 |
| 13 | 6.26 | 5.28 | 5.53 | 5.43 | 4.22 | 5.29 |
| 14 | 6.25 | 5.29 | 5.52 | 5.44 | 5.20 | 6.3 |
| 15 | 6.25 | 5.29 | 5.51 | 5.44 | 6.12 | 6.35 |
| 16 | 6.24 | 5.30 | 5.50 | 5.45 | 6.53 | 7.5 |
| 17 | 6.23 | 5.30 | 5.48 | 5.45 | 7.35 | 7.35 |
| 18 | 6.22 | 5.31 | 5.47 | 5.46 | 8.5 | 8.5 |
| 19 | 6.21 | 5.31 | 5.46 | 5.46 | 8.36 | 8.39 |
| 20 | 6.21 | 5.31 | 5.45 | 5.46 | 9.6 | 9.14 |
| 21 | 6.20 | 5.32 | 5.44 | 5.47 | 9.37 | 9.54 |
| 22 | 6.20 | 5.32 | 5.43 | 5.47 | 10.10 | 10.40 |
| 23 | 6.19 | 5.32 | 5.42 | 5.47 | 10.42 | 11.30 |
| 24 | 6.18 | 5.32 | 5.41 | 5.47 | 11.19 | 12.23 |
| | | | | | noon | p.m. |
| 25 | 6.16 | 5.33 | 5.40 | 5.48 | 12.0 | 1.20 |
| | | | | | p.m. | |
| 26 | 6.14 | 5.33 | 5.38 | 5.48 | 12.49 | 2 23 |
| 27 | 6.13 | 5.34 | 5.37 | 5.48 | 1.42 | 3.25 |
| 28 | 6.11 | 5.34 | 5.36 | 5.49 | 2.38 | 4.28 |
| 29 | 6.10 | 5.35 | 5.35 | 5.49 | 3.38 | 5.30 |
| 30 | 6.9 | 5.35 | 5.34 | 5.50 | 4 40 | 6.35 |
| 31 | 6.7 | 5.36 | ... | ... | 5.43 | ... |

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.



## Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | | |
|---|---|---|---|
| 2 Aug. | ○ | Full Moon | 1 30 a.m. |
| 9 ,, | ☽ | Last Quarter | 3 24 a.m. |
| 15 ,, | ● | New Moon | 11 49 p.m. |
| 23 ,, | ☾ | First Quarter | 6 21 p.m. |
| 31 ,, | ○ | Full Moon | 12 34 p.m. |

Perigee, 11th August, at 2.54 a.m.
Apogee, 23rd August, at 4.42 a.m.

The apparent conjunction of Venus and Neptune on the 10th, at 1 p.m., will only be of interest on account of the enormous distance, 2,724 million miles, which separates the orbits of these planets.

The conjunction of Mercury and the Moon on the 15th will be unobservable as the Moon will not rise till well into daylight, 13 minutes before the sun.

On the 16th Mercury will be in superior conjunction with the Sun, and Neptune on the 22nd.

On the 19th Neptune will be in conjunction with Regulus.

Beta Scorpiis will be occulted soon after 11 p.m. on the 23rd, at Brisbane, Toowoomba and Warwick.

The conjunction of Saturn with the Moon at 9 p.m. on the 24th will be an interesting spectacle well above the south-western horizon, the Moon being a little more than half full and Saturn 2 degrees to the north.

The occultation of Epsilon Capricorni on the 30th will be visible throughout Queensland, occurring shortly before 4.20 a.m., at Brisbane, Toowoomba, Warwick, and other places in Southern Queensland, but earlier at more northern stations.

The Southern Cross during this month will be seen only in positions west of the southern meridian, reaching the prone position when most westerly at 10 p.m. in the beginning of the month, and at 8 p.m. at the end.

| | | | |
|---|---|---|---|
| 7 Sept. | ☽ | Last Quarter | 8 35 a.m. |
| 14 ,, | ● | New Moon | 11 21 a.m. |
| 22 ,, | ☾ | First Quarter | 12 58 p.m. |
| 30 ,, | ○ | Full Moon | 10 42 p.m. |

Perigee, 5th September, at 3 18 a.m.
Apogee, 12th September, at midday.

The occultation of Jupiter by the Moon on the evening of the 4th, soon after half-past 10 in Southern Queensland, should be an interesting spectacle at Brisbane, Toowoomba, and Warwick, where the planet and the Moon will be sufficiently high above the eastern horizon to be fairly well observable.

When the gibbous Moon rises a little before 10 p.m. on the 4th, rather more than twelve degrees north of the east point on the horizon, the big planet Jupitor will be, apparently, very close to its north-eastern edge, the nearness increasing until the occultation takes place. It will be interesting to many observers to notice on the evening before, at 10 p.m., that the Moon will be almost 15 degrees (roughly speaking) above and to the west of Jupiter, a distance measured by the Southern Cross of nearly two and a-half times its length.